

Exhibit A

Melinda Darby Dyar, Ph.D.

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UNITED STATES DISTRICT COURT
DISTRICT OF NEW JERSEY

IN RE: JOHNSON &)
JOHNSON TALCUM POWDER)
PRODUCTS MARKETING)
SALES PRACTICES AND) MDL 16-2738
PRODUCT LIABILITY) (FLW) (LHG)
LITIGATION)
_____)
THIS DOCUMENT)
PERTAINS TO ALL CASES)

TUESDAY, APRIL 2, 2019

- - -

Videotaped deposition of Melinda Darby
Dyar, Ph.D., held at the offices of SKADDEN,
ARPS, MEAGHER & FLOM, LLP, Four Times Square,
New York, New York, commencing at 9:03 a.m.,
on the above date, before Carrie A. Campbell,
Registered Diplomate Reporter and Certified
Realtime Reporter.

- - -

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<p>1 SEYFARTH SHAW LLP</p> <p>2 BY: THOMAS T. LOCKE</p> <p>3 tlocke@seyfarth.com</p> <p>4 975 F Street, N.W.</p> <p>5 Washington, DC 20004</p> <p>6 (202) 463-2400</p> <p>7 Counsel for Defendant Personal Care</p> <p>8 Products Council</p> <p>9</p> <p>10 TUCKER ELLIS LLP</p> <p>11 BY: SANDRA WUNDERLICH</p> <p>12 sandra.wunderlich@tuckerellis.com</p> <p>13 100 South Fourth Street, Suite 600</p> <p>14 St. Louis, Missouri 63102</p> <p>15 (314) 571-4965</p> <p>16 Counsel for PTI Union, LLC and PTI</p> <p>17 Royston, LLC</p> <p>18</p> <p>19 ALSO PRESENT:</p> <p>20 LIZZY HARRISON, Motley Rice</p> <p>21</p> <p>22 VIDEOGRAPHER:</p> <p>23 HENRY MARTE,</p> <p>24 Golkow Litigation Services</p> <p>25 ---</p>	<p>1 Dyar The Analysis of Johnson & 88</p> <p>2 Exhibit 8 Johnson's Historical Product</p> <p>3 Containers and Imerys'</p> <p>4 Historical Railroad Car</p> <p>5 Samples from the 1960s to the</p> <p>6 Early 2000s for Amphibole</p> <p>7 Asbestos, Second Supplemental</p> <p>8 Report, Longo and Rigler</p> <p>9</p> <p>10 Dyar Manual of Mineralogy, Klein 92</p> <p>11 Exhibit 9 and Hurlbut</p> <p>12 Dyar Amphibole Content of Cosmetic 100</p> <p>13 Exhibit 10 and Pharmaceutical Tales, AM</p> <p>14 Blount</p> <p>15 Dyar Defining Asbestos: 139</p> <p>16 Exhibit 11 Differences between the Built</p> <p>17 and Natural Environments,</p> <p>18 Gunther</p> <p>19</p> <p>20 Dyar ResearchGate printout of 143</p> <p>21 Exhibit 12 Tremolite and Mesothelioma</p> <p>22 Dyar Mineralogy and Optical 147</p> <p>23 Exhibit 13 Mineralogy, Dyar, et al.</p> <p>24</p> <p>25 Dyar Page 182 from "Chemical 148</p> <p>26 Exhibit 14 Analysis of Minerals"</p> <p>27 Dyar Case report of 152</p> <p>28 Exhibit 15 Erionite-Associated Malignant</p> <p>29 Pleural Mesothelioma in</p> <p>30 Mexico, Oczypok, et al.</p> <p>31</p> <p>32 Dyar Interoffice Correspondence, 172</p> <p>33 Exhibit 16 March 25, 1992,</p> <p>34 IMERY'S 219720 - IMERY'S 219722</p> <p>35</p> <p>36 Dyar May 23, 2002 Technical Report 172</p> <p>37 Exhibit 17 of Julie Pier,</p> <p>38 IMERY'S 422289 - IMERY'S 422290</p> <p>39</p> <p>40 Dyar Walter McCrone Associates, 223</p> <p>41 Exhibit 18 Inc., November 5, 1975,</p> <p>42 JN161_000079334 -</p> <p>43 JN161_000079335</p>

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<p>1 Dyar Walter McCrone Associates 1 223 Exhibit 19 July 1975 letter, 2 JNJMX68_000012745 - JNJMX68_000012749 3 4 Dyar May 24, 1975 Walter McCrone 223 Exhibit 20 letter from RN Miller, JNJTACL000387254 5 6 Dyar Diffraction Verifications, 236 Exhibit 21 M68233-001, M68233-002 7 Dyar MAS, LLC PLM Analysis, 279 Exhibit 22 M69680-015BL 8 9 Dyar The Asbestiform and 329 Exhibit 23 Nonasbestiform Mineral Growth Habit and Their Relationship to Cancer Studies, A Pictorial Presentation, April 2003 10 11 Dyar Mineral Commodity Profiles - 333 Exhibit 24 Asbestos, USGS 12 Dyar Asbestos, A Mineral of 343 Exhibit 25 Unparalleled Properties, 14 Badollet 15 Dyar J&J Consumer Companies 350 Exhibit 26 Worldwide Specification, 16 TM7024, JNJNL61_000005032 - 17 JNJNL61_000005040 18 19 (Exhibits attached to the deposition.) 20 21 22 23 24 25</p>	<p>1 now on the record. My name is Henry 2 Marte. I'm a videographer with Golkow 3 Litigation Services. 4 Today's date is April 2, 2019, 5 and the time is 9:03 a.m. 6 This videotaped deposition is 7 being held at 4 Times Square, 8 New York, New York, in the Matter of 9 Talcum Powder Litigation. 10 The deponent today is 11 Dr. Melinda Darby Dyar. 12 Will all appearances please 13 introduce themselves for the record. 14 MR. FINCH: Yes. Nate Finch 15 for various ovarian cancer victim 16 plaintiffs. 17 MR. GEIER: Dennis Geier for 18 the plaintiffs. 19 MS. HARRISON: Lizzy Harrison, 20 Motley Rice. 21 MS. O'DELL: Leigh O'Dell on 22 behalf of the plaintiff steering 23 committee. 24 MR. LOCKE: Sorry. 25 MR. CHACHKES: Yeah. Alex</p>
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<p>1 MS. O'DELL: I just have an 2 objection before the deposition 3 starts. 4 Yesterday at 5:50 we received a 5 production of new materials, 6 approximately 140 pages of new data 7 that we had not been provided 8 previously. We've not had an 9 opportunity to review and analyze that 10 data, and based on the late 11 production, we will move to keep this 12 deposition open and continue it after 13 we've had an opportunity to do so. 14 MR. CHACHKES: And obviously we 15 disagree. And you'll have the 16 opportunity to ask the witness about 17 those documents, and you'll find 18 there's no reason to keep anything 19 open. 20 MS. O'DELL: We'll see. 21 MR. FINCH: We'll see. 22 MS. O'DELL: We'll reserve the 23 right to take that to Judge Pisano if 24 we can't reach an agreement. 25 VIDEOGRAPHER: Okay. We are</p>	<p>1 Chachkes on behalf of J&J, Orrick 2 Herrington. 3 MR. FROST: Jack Frost, Drinker 4 Biddle and Reath, on behalf of Johnson 5 & Johnson. 6 MS. SHARKO: Susan Sharko, 7 Drinker Biddle, same. 8 MS. WUNDERLICH: Sandra 9 Wunderlich, Tucker Ellis, on behalf of 10 PTI Royston and PTI Union. 11 MR. LOCKE: Tom Locke for the 12 Personal Care Products Council. 13 VIDEOGRAPHER: Okay. Will the 14 court reporter please administer the 15 oath to the witness. 16 17 MELINDA DARBY DYAR, Ph.D., 18 of lawful age, having been first duly sworn 19 to tell the truth, the whole truth and 20 nothing but the truth, deposes and says on 21 behalf of the Plaintiffs, as follows: 22 23 DIRECT EXAMINATION 24 QUESTIONS BY MR. FINCH: 25 Q. Good morning, Ms. Darby Dyar.</p>

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<p style="text-align: right;">Page 10</p> <p>1 My name is Nate Finch. I</p> <p>2 introduced myself off the record to you. As</p> <p>3 I said before, I represent various ovarian</p> <p>4 cancer victim plaintiffs.</p> <p>5 Have you ever had your</p> <p>6 deposition taken before?</p> <p>7 A. No.</p> <p>8 Q. Have you ever testified in a</p> <p>9 courtroom before?</p> <p>10 A. No.</p> <p>11 Q. Have you ever done what's</p> <p>12 called a mock deposition, where someone</p> <p>13 videotapes you and asks you questions as if</p> <p>14 you were being deposed or testifying in</p> <p>15 court?</p> <p>16 MR. CHACHKES: So I'm going to</p> <p>17 object on work product grounds.</p> <p>18 You can answer to the extent</p> <p>19 it's not anything you've done with</p> <p>20 counsel in this case.</p> <p>21 THE WITNESS: Correct, it's not</p> <p>22 anything I've ever done with counsel</p> <p>23 in this case.</p> <p>24 QUESTIONS BY MR. FINCH:</p> <p>25 Q. So never done it your entire</p>	<p style="text-align: right;">Page 12</p> <p>1 income into.</p> <p>2 Q. How long has Palouse Minerals</p> <p>3 been in existence?</p> <p>4 A. A couple months.</p> <p>5 Q. In what state was it formed?</p> <p>6 What's the --</p> <p>7 A. Massachusetts.</p> <p>8 Q. So it's a Massachusetts LLC?</p> <p>9 A. Yes.</p> <p>10 Q. And what's the business address</p> <p>11 for it?</p> <p>12 A. 161 Chestnut Street in Amherst,</p> <p>13 Mass.</p> <p>14 Q. Is that the same as your office</p> <p>15 address?</p> <p>16 A. Yes, it is.</p> <p>17 Q. Is it --</p> <p>18 A. To which office are you</p> <p>19 referring?</p> <p>20 Q. Or which office does it</p> <p>21 correspond to?</p> <p>22 A. It corresponds to my home</p> <p>23 office.</p> <p>24 Q. So it's your home address as</p> <p>25 well?</p>
<p style="text-align: right;">Page 11</p> <p>1 life, or you've done it in this case?</p> <p>2 MR. CHACHKES: So the objection</p> <p>3 was don't talk about what we did in</p> <p>4 this case, but you're welcome to talk</p> <p>5 about other stuff.</p> <p>6 THE WITNESS: No, I've never</p> <p>7 done it ever before.</p> <p>8 QUESTIONS BY MR. FINCH:</p> <p>9 Q. So am I correct that you have</p> <p>10 never been recognized by a court as an expert</p> <p>11 in anything? Is that correct?</p> <p>12 A. That is correct.</p> <p>13 Q. What is Palouse Minerals, LLC?</p> <p>14 A. It is an LLC entity that I</p> <p>15 created for the purposes of -- on the basis</p> <p>16 of the recommendation of my personal lawyer.</p> <p>17 Q. Created for the purposes of</p> <p>18 what, receiving funds that you earn as an</p> <p>19 expert witness?</p> <p>20 Is that one of the reasons you</p> <p>21 created it?</p> <p>22 A. I do considerable consulting</p> <p>23 for NASA, and I decided it would be useful to</p> <p>24 have an entity that I could consolidate my</p> <p>25 non-Mount Holyoke and non-planetary science</p>	<p style="text-align: right;">Page 13</p> <p>1 A. Correct.</p> <p>2 Q. Are you the -- the sole member</p> <p>3 of Palouse Minerals, LLC, meaning the sole</p> <p>4 person that has an ownership stake in it?</p> <p>5 A. Yes.</p> <p>6 Q. There are no other -- are there</p> <p>7 any other limited partners that receive an</p> <p>8 income distribution or other distribution for</p> <p>9 Palouse Minerals?</p> <p>10 A. No.</p> <p>11 Q. Does it have any employees?</p> <p>12 A. Other than me, no.</p> <p>13 Q. When were you first contacted</p> <p>14 by someone -- let me back up.</p> <p>15 Who are you working for in</p> <p>16 connection with this case in which your</p> <p>17 deposition is being taken today?</p> <p>18 A. I'm not exactly sure what you</p> <p>19 mean.</p> <p>20 Do you mean who do I send the</p> <p>21 bills to?</p> <p>22 Q. Well, you're being compensated</p> <p>23 for your time, I assume, correct?</p> <p>24 A. Correct.</p> <p>25 Q. All right. And you send the</p>

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<p style="text-align: right;">Page 14</p> <p>1 bills to Tucker Ellis. That's a law firm; is 2 that correct? 3 A. I believe so. 4 Q. And do you have an 5 understanding as to what party in this 6 litigation you are serving as an expert 7 witness for? 8 A. Yes. 9 Q. All right. Who are you working 10 for? 11 A. So the checks come from Orrick, 12 and Orrick is hired by Johnson & Johnson. 13 Q. Are you working for any other 14 party to this litigation, other than 15 Johnson & Johnson or Johnson & Johnson 16 Consumer, Inc., or any other Johnson & 17 Johnson subsidiary? 18 A. No. 19 Q. So you're not being compensated 20 or doing any work with a company called 21 Imerys, for example? 22 A. No. 23 MR. FINCH: Lizzy, can I have 24 the notice of deposition? 25 (Dyar Exhibit 1 marked for</p>	<p style="text-align: right;">Page 16</p> <p>1 this expert engagement other than you? 2 A. No. 3 Q. The reason I ask that question, 4 on the invoices that were produced yesterday 5 evening, there are a couple of instances 6 where there's redactions and the person 7 was -- the person or entity was redacted, and 8 that led me to believe there might have been 9 someone else other than you who worked on the 10 report. 11 MR. CHACHKES: Objection. 12 THE WITNESS: No one else but 13 me worked on the report. 14 QUESTIONS BY MR. FINCH: 15 Q. Okay. What were you asked to 16 do by Johnson & Johnson or its lawyers? 17 A. I was asked to review the 18 methodology used by Drs. Longo and Rigler in 19 a series of reports. 20 Q. Anything else? 21 A. I was asked to write a report 22 giving my review. 23 Q. What methodology did you follow 24 in analyzing Dr. Longo and Rigler's reports? 25 A. Well, I've been a reviewer of</p>
<p style="text-align: right;">Page 15</p> <p>1 identification.) 2 QUESTIONS BY MR. FINCH: 3 Q. Ma'am, I've put what's been 4 marked as Darby Dyar Exhibit 1 in front of 5 you. 6 Have you ever seen this or 7 discussed it, the subject matters of what it 8 is, with anyone? 9 A. Yes and yes. 10 Q. And what is your understanding 11 of what this is? 12 A. It's a notice that I'm going to 13 testify today, and these are the documents 14 that are related to the case. 15 Q. Okay. When were you first 16 contacted by someone on behalf of Johnson & 17 Johnson to do work for it in connection with 18 these cases? 19 A. I don't remember exactly, but 20 sometime last fall after school started. 21 Q. Okay. And am I correct that 22 your time is billed out at \$500 an hour? 23 A. That is correct. 24 Q. And has anyone else from 25 Palouse Minerals done work in connection with</p>	<p style="text-align: right;">Page 17</p> <p>1 scientific documents for almost 40 years, and 2 so I used the same methodology I'd use for 3 reviewing a scientific paper or a proposal or 4 any kind of report that comes across my 5 research interests. 6 So I first read the report 7 carefully, every word. Then I looked at all 8 of the math and all the numbers and analyzed 9 the numbers. Then I sought out all of the 10 references that were cited in those reports 11 and tried to read all of them. And then I 12 looked at the report many times and tried to 13 see if the information in the report 14 justified the conclusions. 15 Q. Did you test any talc that was 16 the source of Johnson's baby powder or SHOWER 17 TO SHOWER® yourself? 18 A. No. 19 Q. Did you test any talc that was 20 mined either in Italy or Vermont or China for 21 the purposes of analyzing whether or not it 22 contained asbestos or asbestos fibers? 23 A. No. 24 Q. Did you review any internal 25 documents of Johnson & Johnson that indicated</p>

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<p style="text-align: right;">Page 18</p> <p>1 the results of its testing of either its baby 2 powder or SHOWER TO SHOWER® products or the 3 ore from the Vermont mine or other sources of 4 talc? 5 A. No. 6 Q. Did you review any testimony 7 from any of Johnson & Johnson's corporate 8 witnesses related to the source of -- let me 9 just ask it this way. 10 Did you review any testimony of 11 anyone other than Dr. Longo and Dr. Rigler? 12 A. Yes, I reviewed reports only by 13 Krekeler, Cook and Campion. 14 Q. And you reviewed their reports, 15 but you haven't commented on any of those 16 reports; is that correct? 17 A. There was no need to comment on 18 those reports because they did not have -- 19 they did not bear on my evaluation of the 20 methodology of Longo and Rigler. 21 Q. Okay. 22 A. But I read them just in case. 23 Q. All right. Am I correct that 24 you don't have an opinion one way or another 25 as to whether or not there is asbestos in</p>	<p style="text-align: right;">Page 20</p> <p>1 A. My name appears on publications 2 in which the author list includes Matt, yes. 3 Q. Have you reviewed any of 4 Mr. Sanchez's testimony in connection with 5 any Johnson & Johnson talc litigation? 6 A. No. 7 Q. You have published multiple 8 papers and also a book with a gentleman by 9 the name of Mickey Gunther, correct? 10 A. That's correct. 11 Q. Have you ever reviewed any of 12 Dr. Gunther's testimony in asbestos 13 litigation on behalf of any of the parties 14 that he's worked for? 15 A. No. 16 Q. Did you review any deposition 17 or trial testimony of any Johnson & Johnson 18 witness in connection with your work in this 19 case? 20 And by that I would include 21 Dr. John Hopkins or any of the other 22 employees or former employees of Johnson & 23 Johnson. 24 A. No. 25 Q. Did you review any summaries of</p>
<p style="text-align: right;">Page 19</p> <p>1 Vermont talc that was a source for Johnson's 2 baby powder? 3 A. Can you restate that question? 4 Q. I didn't see anywhere in your 5 report an affirmative opinion as to whether 6 or not there is or is not asbestiform 7 materials, asbestos fibers, in the talc from 8 either Vermont or Italy or China that was the 9 source of Johnson's baby powder. 10 MR. LOCKE: Objection. 11 THE WITNESS: No, my job in 12 this matter was to review the 13 methodology of Drs. Longo and Rigler. 14 QUESTIONS BY MR. FINCH: 15 Q. Did you review the testimony 16 of -- do you know Ann Wylie, by any chance? 17 A. I believe I've met Ann Wylie 18 once, maybe, but I couldn't pick her out of a 19 crowd. 20 Q. Did you review her testimony 21 that was taken in connection with these cases 22 as part of your work here? 23 A. No. 24 Q. You have written papers with 25 Matthew Sanchez, correct?</p>	<p style="text-align: right;">Page 21</p> <p>1 any deposition or trial testimony of anyone 2 other than possibly Dr. Longo and Dr. Rigler? 3 A. No. 4 Q. When you were first contacted 5 to work on behalf of Johnson & Johnson, who 6 did you -- how did -- how were you first 7 contacted? 8 Who contacted you? 9 A. I -- to the best of my memory, 10 I was sitting in my Mount Holyoke office, and 11 I got a phone call from a lawyer in 12 Cleveland. 13 Q. This was a lawyer for the 14 Tucker Ellis firm? 15 A. I'm not sure where he works. 16 Q. What was the name of the 17 lawyer? 18 A. Chris Caryl, Caryl. I'm not 19 sure how you pronounce his name. 20 Q. And in that conversation, what 21 did he ask you to do? 22 A. He asked me if I had ever done 23 any expert witness work and if that would 24 interest me, and he told me a little bit 25 about the case. I don't remember exactly</p>

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<p>1 what he said, but he asked me if I'd be 2 interested, and I said I would think about 3 it. 4 Q. And obviously you eventually 5 said yes, correct? 6 A. Correct. 7 Q. And you ultimately put together 8 an expert witness report that contains your 9 opinions and conclusions in this case; is 10 that correct? 11 A. Yes. 12 MR. FINCH: Lizzy, can I have 13 the report? 14 (Dyar Exhibit 2 marked for 15 identification.) 16 QUESTIONS BY MR. FINCH: 17 Q. Ma'am, I've marked as Darby 18 Dyar Deposition Exhibit 2 a document entitled 19 "Expert Report of M. Darby Dyar, Ph.D., for 20 General Causation, Daubert Hearing." 21 Can you take a look at this 22 document and tell me what it is? 23 A. This is my report. 24 Q. And it has a copy of your CV 25 attached to the back of it as Exhibit B?</p>	<p>1 determine whether they have asbestos in them? 2 A. Other than the depositions 3 taken this year, no. 4 Q. And the depositions that were 5 taken this year was a one-day deposition 6 taken February 5th or 6th of 2019? 7 A. I believe that's correct. 8 Q. Were you aware that Dr. Longo 9 has testified dozens of times about -- in 10 courtrooms with judges, both federal and 11 state present, about the methodology he 12 follows to analyze the presence of asbestos 13 fibers in materials? 14 A. That's what he says in his -- 15 in the beginning of his most recent 16 deposition, yes. 17 Q. And you didn't ask to review 18 any of that testimony where he describes what 19 he does or how his lab works in detail? 20 A. The current deposition makes it 21 clear that his methodology has remained 22 constant, and so it wasn't necessary to 23 review previous methodologies. 24 Q. What is your understanding of 25 what an expert witness report like Exhibit 2</p>
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<p>1 Exhibit A, excuse me. 2 A. Yes. 3 Q. Did you, as part of your work 4 in this case, ask to see the same samples 5 that Dr. Longo in his laboratory analyzed, 6 have those sent to you so you could analyze 7 them yourself? 8 A. No. 9 Q. Why not? 10 A. My job here was to review the 11 methodology employed by Drs. Longo and 12 Rigler. It was not to do testing. 13 Q. Did you review any testimony of 14 Dr. Longo other than his deposition taken in 15 this case in February of this year? 16 A. No. 17 Q. Did you review any of Mark 18 Rigler's testimony other than his deposition 19 taken in connection with these cases in 20 February of this year? 21 A. No. 22 Q. So am I correct that you have 23 never reviewed testimony of Dr. Longo where 24 he describes his methodology generally that 25 his lab follows for analyzing substances to</p>	<p>1 is for? 2 A. It is to present the opinion of 3 an expert witness on matters that they are 4 asked to evaluate. 5 Q. Do you have the understanding 6 that it is supposed to set forth your 7 opinions and the bases for your opinions on 8 various topics? 9 A. Yes. 10 MR. FINCH: Let's mark as 11 Exhibit 3 -- and I don't have a hard 12 copy with me because I just got it by 13 e-mail last night -- the production 14 materials that were sent to us at 15 5:50 p.m. 16 And could I switch to the iPad? 17 VIDEOGRAPHER: No problem. 18 MR. FINCH: And we'll send this 19 to the court reporter electronically. 20 (Dyar Exhibit 3 marked for 21 identification.) 22 MR. CHACHKES: We have paper 23 copies here. 24 MR. FINCH: If you've got a 25 paper copy you can hand to me, that</p>

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<p style="text-align: right;">Page 26</p> <p>1 would probably speed up the process a 2 little bit. 3 MR. CHACHKES: We could 4 actually have it -- so if we want one 5 for the witness as well -- so we've 6 got one copy. We can take a break 7 and -- 8 MR. FINCH: I don't want to 9 take a break. 10 MR. CHACHKES: Okay. 11 MR. FINCH: I'll come back to 12 it. But I'm going to ask a few 13 questions now, and then if you can, at 14 a break -- 15 QUESTIONS BY MR. FINCH: 16 Q. Okay. Ma'am, can you see the 17 screen here that I'm flipping? 18 A. No. 19 Q. There's a screen in front of 20 you. 21 A. That's way too small. 22 Q. Okay. 23 A. I can certainly use the paper 24 copy. 25 MR. CHACHKES: So I've got the</p>	<p style="text-align: right;">Page 28</p> <p>1 and calculations that you've made and set 2 forth in the report, Exhibit 2? 3 A. Yes, they are. 4 Q. So basically if I want to check 5 your math, I look at the spreadsheets, right? 6 A. Correct. 7 Q. Okay. So you said you were 8 first contacted sometime last fall by a 9 lawyer named Christopher Caryl from the 10 Tucker Ellis law firm about doing expert 11 witness work for Johnson & Johnson; is that 12 correct? 13 A. That is correct. 14 Q. And I have on the screen here, 15 which you probably can flip to, a series of 16 invoices beginning in November of 2018 which 17 reflects work done in October, all the way up 18 through a March 4th invoice which reflects 19 work done in February of 2019. 20 Do you see those invoices? 21 A. I do see them, yes. 22 Q. Okay. My document isn't page 23 numbered, but on the screen there is a 24 contract signed by you on behalf of your 25 company and Johnson & Johnson.</p>
<p style="text-align: right;">Page 27</p> <p>1 paper copy. 2 MR. FINCH: All right. Counsel 3 for Johnson & Johnson kindly provided 4 the witness with his copy. 5 QUESTIONS BY MR. FINCH: 6 Q. But suffice it to say, did you 7 have the understanding that some additional 8 material was provided to us yesterday in 9 connection with the subpoena you got? 10 A. Yes. 11 Q. Okay. What is your 12 understanding of what was provided to us? 13 A. I believe it was copies of my 14 bills and a copy of my updated CV. 15 Q. Okay. And also contained 16 some -- 17 A. Oh, and -- okay, go ahead. 18 Q. I've got your bills. I've got 19 your updated CV. 20 What is the material, say, the 21 last hundred pages, hundred-plus pages, of 22 the document? 23 A. Those would be my spreadsheets. 24 Q. Okay. Are those the 25 spreadsheets that underlie the conclusions</p>	<p style="text-align: right;">Page 29</p> <p>1 Do you see that? 2 A. Yes. 3 Q. Okay. You started working on 4 this project before the contract was signed. 5 Why is that? 6 A. Because I -- before this 7 contract was signed, because I -- it took me 8 a while to get the legal paperwork for 9 Palouse Minerals organized and approved by 10 Massachusetts. 11 Q. Okay. So you had to set up the 12 LLC. You started doing work, you set up the 13 LLC, and once that was set up, you had 14 Johnson & Johnson's attorneys enter into a 15 contract with you on behalf of LLC, correct? 16 A. Correct. 17 Q. Okay. The first invoice I have 18 here reflects work done in October, and it 19 has an entry for 19 hours and 18 hours, both 20 billed at \$500 an hour, for a total of 21 18,500. 22 Do you see that? 23 A. Yes. 24 Q. Okay. What is the 19 hours and 25 what is the 18 hours?</p>

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<p>1 MR. CHACHKES: Objection.</p> <p>2 Are you asking what's been</p> <p>3 redacted?</p> <p>4 MR. FINCH: Well, I'm asking</p> <p>5 if -- is the redaction basically a</p> <p>6 description of the work, or is the</p> <p>7 redaction the name of a person?</p> <p>8 MR. CHACHKES: So you can --</p> <p>9 I'm going to object on work product</p> <p>10 grounds.</p> <p>11 You can answer on a general</p> <p>12 high level.</p> <p>13 THE WITNESS: Can you restate</p> <p>14 that question, please?</p> <p>15 QUESTIONS BY MR. FINCH:</p> <p>16 Q. Yeah.</p> <p>17 There's a breakdown between 19</p> <p>18 and 18 hours. Is all the work in all these</p> <p>19 invoices performed by you?</p> <p>20 A. Absolutely, yes.</p> <p>21 Q. Okay. So there's nobody else</p> <p>22 that's done any work on this expert witness</p> <p>23 report or your analysis of Dr. Longo and</p> <p>24 Dr. Rigler's reports, correct?</p> <p>25 A. No.</p>	<p>1 object on work product grounds. The</p> <p>2 communications with Professor Dyar are</p> <p>3 going to be privileged, so I'm going</p> <p>4 to ask the witness not to respond to</p> <p>5 this line of questioning.</p> <p>6 MR. FINCH: So noted.</p> <p>7 QUESTIONS BY MR. FINCH:</p> <p>8 Q. Did any lawyers for Johnson &</p> <p>9 Johnson suggest areas of inquiry for you as</p> <p>10 part of your analysis of Dr. Longo's work?</p> <p>11 MR. CHACHKES: So same</p> <p>12 objection.</p> <p>13 Please don't respond.</p> <p>14 QUESTIONS BY MR. FINCH:</p> <p>15 Q. Did any lawyers for Johnson &</p> <p>16 Johnson provide you with any of the pictures</p> <p>17 that appear in your report?</p> <p>18 A. Some of the images in my report</p> <p>19 come from the Longo, Rigler reports. So to</p> <p>20 the extent that I received the Longo and</p> <p>21 Rigler reports from counsel, then, yes, some</p> <p>22 of the images came from there.</p> <p>23 Q. Did you review all of the, for</p> <p>24 lack of a better word, backup material for</p> <p>25 all of the Longo and Rigler reports?</p>
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<p>1 Q. Did you confer with anyone in</p> <p>2 connection with your review of Dr. Longo's --</p> <p>3 and rather than saying Longo and Rigler again</p> <p>4 and again and again, I'm just going to say</p> <p>5 Longo.</p> <p>6 Did you confer with anyone in</p> <p>7 connection with your review of Dr. Longo's</p> <p>8 reports or your writing of your report?</p> <p>9 MR. CHACHKES: Objection.</p> <p>10 THE WITNESS: Yes.</p> <p>11 QUESTIONS BY MR. FINCH:</p> <p>12 Q. Who did you confer with?</p> <p>13 A. Counsel.</p> <p>14 Q. That would be lawyers for</p> <p>15 Johnson & Johnson?</p> <p>16 A. Yes.</p> <p>17 Q. Did you share drafts with them</p> <p>18 of your report?</p> <p>19 A. Yes.</p> <p>20 Q. Did they provide comments on</p> <p>21 the drafting?</p> <p>22 A. Yes.</p> <p>23 Q. Did you consider their</p> <p>24 suggestions in writing your report?</p> <p>25 MR. CHACHKES: So I'm going to</p>	<p>1 A. I looked at every single page.</p> <p>2 Q. Did you look at every single</p> <p>3 photograph or photomicrograph on every single</p> <p>4 page of Dr. Rigler and Dr. Longo's backup</p> <p>5 materials to their reports?</p> <p>6 A. Yes.</p> <p>7 Q. Did you confer with anyone else</p> <p>8 on either your analysis of Dr. Longo and</p> <p>9 Rigler's work or your report, other than</p> <p>10 Johnson & Johnson's lawyers?</p> <p>11 A. Yes.</p> <p>12 Q. Who did you confer with?</p> <p>13 A. Dr. Mickey Gunther.</p> <p>14 Q. Who else?</p> <p>15 A. No one else.</p> <p>16 Q. Did Dr. Gunther provide any</p> <p>17 written comments or suggestions to you in</p> <p>18 your work analysis -- your work in this case?</p> <p>19 MR. CHACHKES: So again, I'm</p> <p>20 going to object on work product</p> <p>21 grounds. Dr. Gunther is a consultant</p> <p>22 for J&J, so I'm going to ask the</p> <p>23 witness not to respond to this line.</p> <p>24 MR. FINCH: Well, we disagree</p> <p>25 with that, but we'll take it up at the</p>

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<p style="text-align: right;">Page 34</p> <p>1 appropriate time.</p> <p>2 QUESTIONS BY MR. FINCH:</p> <p>3 Q. Did you review Dr. Campion's</p> <p>4 report and publications in connection with</p> <p>5 your work in this case?</p> <p>6 A. I did look at them, yes.</p> <p>7 Q. Did you come to any conclusions</p> <p>8 about them?</p> <p>9 MR. CHACHKES: So I'm going to</p> <p>10 object to this on work product</p> <p>11 grounds. To the extent there were any</p> <p>12 communications, it was not with</p> <p>13 respect to this report.</p> <p>14 QUESTIONS BY MR. FINCH:</p> <p>15 Q. You don't intend to testify</p> <p>16 about any conclusions related to</p> <p>17 Dr. Campion's report?</p> <p>18 A. My purpose here was to review</p> <p>19 only the Longo and Rigler reports.</p> <p>20 Q. In November of 2018, you sent</p> <p>21 an invoice for 37 hours of work -- for work</p> <p>22 done in October of 2018.</p> <p>23 What were you reviewing or</p> <p>24 doing during that 37 hours given that</p> <p>25 Dr. Longo didn't issue his first report in</p>	<p style="text-align: right;">Page 36</p> <p>1 A. That's correct.</p> <p>2 Q. Okay. So in total you've</p> <p>3 billed over \$150,000 to this project so far,</p> <p>4 at least as of the end of February 2019?</p> <p>5 A. I haven't done the math, but</p> <p>6 that seems about right.</p> <p>7 Q. How much time have you spent in</p> <p>8 March of 2019 working on this project?</p> <p>9 A. I don't really know, but not</p> <p>10 much. I wouldn't like to speculate without</p> <p>11 checking my records.</p> <p>12 Q. More than 20 hours?</p> <p>13 A. Yes.</p> <p>14 Q. More than 50 hours?</p> <p>15 A. Probably no.</p> <p>16 Q. How about in April?</p> <p>17 I know it's only the 2nd day of</p> <p>18 April, but did you spend any time yesterday?</p> <p>19 A. Yes.</p> <p>20 Q. What did you do yesterday as</p> <p>21 part of your work for Johnson & Johnson in</p> <p>22 this case?</p> <p>23 MR. CHACHKES: So again, I'm</p> <p>24 going to object on work product</p> <p>25 grounds, but you can answer on a very</p>
<p style="text-align: right;">Page 35</p> <p>1 the MDL until the middle of November?</p> <p>2 A. I was reviewing prior</p> <p>3 documents, prior reports, of Dr. Longo.</p> <p>4 Q. You mean his reports done in</p> <p>5 connection with state court asbestos</p> <p>6 litigation from 2018, earlier in 2018 and</p> <p>7 partially in 2017?</p> <p>8 A. Let's have a look at the list</p> <p>9 of documents that I included in my report.</p> <p>10 Q. You're looking at Exhibit</p> <p>11 Number 3 -- 2, Exhibit Number 2.</p> <p>12 A. So the first document was</p> <p>13 produced in March -- on March 11, 2018.</p> <p>14 Q. Uh-huh.</p> <p>15 A. Another document was produced</p> <p>16 on September 6th of 2018, and another one was</p> <p>17 produced in September of 2017. So those</p> <p>18 documents were available to me immediately.</p> <p>19 And then when the October 2018 document</p> <p>20 became available, it was given to me.</p> <p>21 Q. So your November invoice was</p> <p>22 for \$18,500; December, 30,000; January,</p> <p>23 25,500; February invoice for January work,</p> <p>24 35,000; and then your March invoice for</p> <p>25 February work was 63,000. Is that correct?</p>	<p style="text-align: right;">Page 37</p> <p>1 high level.</p> <p>2 THE WITNESS: I prepared for</p> <p>3 this deposition.</p> <p>4 QUESTIONS BY MR. FINCH:</p> <p>5 Q. And what did you do to prepare</p> <p>6 for this deposition?</p> <p>7 MR. CHACHKES: Again, I'm going</p> <p>8 to object on work product grounds and</p> <p>9 maybe counsel the witness not to</p> <p>10 answer.</p> <p>11 If you have any specific</p> <p>12 questions that don't threaten the work</p> <p>13 product protections, then you can ask</p> <p>14 those.</p> <p>15 MR. FINCH: I'll leave the</p> <p>16 question as it is.</p> <p>17 MR. CHACHKES: Okay. So please</p> <p>18 don't answer.</p> <p>19 QUESTIONS BY MR. FINCH:</p> <p>20 Q. On the invoices where it says</p> <p>21 "redacted" in several places, can you tell me</p> <p>22 generally what kind of information was</p> <p>23 redacted?</p> <p>24 Is it information relating to</p> <p>25 what you were doing, or is it information</p>

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<p>1 like Social Security numbers or something 2 like that? 3 A. It's information related to 4 what I was doing. 5 Q. Okay. So it describes the 6 tasks that you were performing in connection 7 with your expert witness work in this case? 8 A. Correct. 9 MR. FINCH: All right. We 10 would make a request for an unredacted 11 version of the invoices. 12 MR. CHACHKES: We'll take it 13 under advisement. 14 MS. SHARKO: Any requests, 15 please put in writing. 16 MR. FINCH: Okay. This is 17 writing, since someone's writing it 18 down, but we will do it in a letter. 19 MS. SHARKO: Okay. And keep in 20 mind that we will then reciprocate. 21 QUESTIONS BY MR. FINCH: 22 Q. Let's just get some terms on 23 the record. 24 What does EDS, EDXA stand for? 25 A. Energy-dispersive spectrometry,</p>	<p>1 microscope, and it is possible for the 2 analyst to rotate it in various dimensions 3 and directions? 4 A. Yes, that is correct, and as 5 described in the quotation on page 31 of my 6 report. 7 Q. And so -- which quotation are 8 you referring to? 9 A. The quotation from ISO 2262-1 10 {sic} on page 65 which describes the process 11 by which you align a sample for an SAED 12 pattern. 13 Q. Okay. And am I correct that 14 that is something that the analyst, when 15 looking at the substance or the structure 16 through the TEM, is rotating the material in 17 realtime and deciding when to make an image 18 of that? 19 A. Correct. 20 Q. And is it correct that an 21 analyst, in reviewing the structure or 22 substance in realtime, can decide to take an 23 image of the selected area of diffraction 24 pattern whenever, in his or her judgment, he 25 finds something worth capturing?</p>
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<p>1 or spectroscopy, depending on how you define 2 it, and then other people call it 3 energy-dispersive X-ray analysis. They're 4 general terms for the same thing. 5 Q. And am I correct that that is a 6 test for elemental chemistry? 7 A. It's a qualitative test for 8 elemental chemistry. 9 Q. Qualitative, 10 q-u-a-l-i-t-a-t-a-v-e {sic}? 11 A. Correct. 12 Q. And that is an analysis 13 performed by a transmission electron 14 microscope, correct? 15 A. Yes. 16 Q. Explain what is SAED. 17 A. SAED refers to a kind of 18 electron diffraction done on a TEM in which 19 the electrons are passed through the sample 20 and they are diffracted, resulting in a 21 pattern. 22 Q. And am I correct that when a 23 sample is analyzed under SAED, the material 24 is placed, for lack of a better word, on the 25 plate of the transmission electron</p>	<p>1 MR. CHACHKES: Objection. 2 THE WITNESS: That would be a 3 standard operating procedure, yes. 4 QUESTIONS BY MR. FINCH: 5 Q. So a standard operating 6 procedure would be the analyst takes the 7 substance or material and has the ability to 8 rotate it in three dimensions and analyze the 9 crystal structure of the material under the 10 TEM, correct? 11 A. It's not a full three 12 dimensions, but it's basically a plane that 13 has the ability to be tilted by a small 14 number of degrees in various directions. 15 Q. Okay. And in the process of 16 doing that, the analyst can spend as much or 17 as little time as it takes him or her to look 18 at the structure or material in the various 19 dimensions and take a picture, for lack of a 20 better word, of the diffraction pattern at 21 whatever points in time he or she thinks are 22 important, correct? 23 A. Correct. 24 Q. And it's -- it is in some sense 25 the judgment of the analysts at what point in</p>

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<p>1 time he or she takes the picture of the 2 selected area of diffraction pattern, 3 correct? 4 A. Yes. 5 Q. You have degrees in geology and 6 art history; is that correct? 7 A. Correct. 8 Q. You have a Ph.D. in geology? 9 A. My Ph.D. is actually in 10 geochemistry. 11 Q. In geochemistry. 12 And how did you first get 13 interested in geology? 14 A. I don't actually recall. I 15 think when I was 2 years old, my mother 16 reports that I picked up rocks instead of 17 Easter eggs on an egg hunt. That was the 18 first indication that maybe geology was in my 19 future. 20 Q. You graduated with a bachelor's 21 of art in geology and art history from 22 Wellesley College, correct? 23 A. As it says in my résumé, when 24 I -- at the time I graduated, my BA was in 25 geology, and I finished the course</p>	<p>1 diseases? 2 A. No. 3 Q. You're not a toxicologist? 4 A. No. 5 Q. Have you ever performed an 6 animal study in the sense of either having an 7 animal ingest or inhale or otherwise come 8 into contact with a substance to determine 9 whether that substance has hazardous effects? 10 A. No. 11 Q. I take it you do not have an 12 expert opinion as to whether any of the 13 materials found in Johnson & Johnson's talc 14 or Johnson & Johnson's baby powder are 15 carcinogenic? 16 A. I have no opinion on that. 17 Q. You have no expert opinion 18 regarding whether any amphiboles found in 19 talc from New York, the Gouverneur talc mine, 20 are carcinogenic; is that correct? 21 MR. LOCKE: Objection. 22 THE WITNESS: I have no opinion 23 on that. 24 QUESTIONS BY MR. FINCH: 25 Q. Do you have any opinion about</p>
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<p>1 requirements for the art history degree while 2 I was enrolled at MIT subsequent to my 3 graduation from Wellesley. 4 Q. And you got your Ph.D. in 5 geochemistry from MIT, correct? 6 A. Correct. 7 Q. You're not an epidemiologist, 8 correct? 9 A. No. 10 Q. You're not a medical doctor? 11 A. No. 12 Q. You don't hold yourself out as 13 an expert on the biological activity of 14 substances in the human body; is that 15 correct? 16 A. No. 17 Q. You're not a cell biologist? 18 A. I work with a microbiologist 19 and I have written papers on microbiology, 20 but I don't consider myself a cell biologist, 21 no. 22 Q. Do you hold yourself out as an 23 expert in analyzing whether or not and how 24 fibers and structures can cause genetic 25 errors which lead to cancer or other</p>	<p>1 whether the amphiboles found in Libby 2 vermiculite are carcinogenic? 3 A. I have no opinion on that. 4 Q. You have no expert opinion on 5 that? 6 A. No. 7 Q. Are you familiar with the fact 8 that there has been an epidemic of 9 mesothelioma in and around Libby, Montana? 10 MR. FROST: Objection. 11 MR. LOCKE: Objection. 12 THE WITNESS: Vaguely. 13 QUESTIONS BY MR. FINCH: 14 Q. How did you come to that 15 understanding? 16 MR. FROST: Objection. 17 THE WITNESS: I read it in a 18 newspaper maybe? 19 QUESTIONS BY MR. FINCH: 20 Q. When was the first time you met 21 Mickey Gunther? 22 A. In the summer of 1996, I met 23 Mickey at a teaching mineralogy workshop at 24 Smith College. 25 Q. Were you on the faculty of that</p>

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<p>1 workshop, or was he on the faculty of that</p> <p>2 workshop? How did you come in contact?</p> <p>3 A. I was driving a van on the</p> <p>4 field trip, and Mickey got in and sat next to</p> <p>5 me.</p> <p>6 Q. And since that time, you have</p> <p>7 collaborated on both a textbook and about,</p> <p>8 what, 30 papers, something like that?</p> <p>9 A. I don't keep count of the</p> <p>10 papers, but they're all as listed in my CV.</p> <p>11 Q. Could you identify for me your</p> <p>12 peer-review publications which address the</p> <p>13 subject of how to determine if a material is</p> <p>14 asbestos in the environment?</p> <p>15 MR. CHACHKES: Objection.</p> <p>16 THE WITNESS: I would have to</p> <p>17 spend some time going through the list</p> <p>18 to see if there are any that satisfy</p> <p>19 those criteria. I don't recall.</p> <p>20 QUESTIONS BY MR. FINCH:</p> <p>21 Q. Can you think of any off the</p> <p>22 top of your head right now?</p> <p>23 A. No.</p> <p>24 Q. Have you ever published a</p> <p>25 peer-review publication regarding how to</p>	<p>1 me back up.</p> <p>2 Have you ever been in charge of</p> <p>3 a laboratory where the laboratory regularly</p> <p>4 tested materials to determine if they</p> <p>5 contained asbestos?</p> <p>6 A. No.</p> <p>7 Q. Have you analyzed over 300</p> <p>8 samples of material -- 300,000 samples of</p> <p>9 materials over the course of your career to</p> <p>10 detect whether or not asbestos was present in</p> <p>11 them?</p> <p>12 A. No.</p> <p>13 Q. Have you ever been recognized</p> <p>14 by a court as an expert witness on the</p> <p>15 subject of examining material to determine</p> <p>16 whether it contained asbestos?</p> <p>17 A. No.</p> <p>18 Q. Have you ever served as an</p> <p>19 expert consultant for the City of New York,</p> <p>20 the State of New York, the State of Utah or</p> <p>21 any other governmental entity on the subject</p> <p>22 of examining material to determine whether it</p> <p>23 contained asbestos?</p> <p>24 A. No.</p> <p>25 Q. Have you ever been the primary</p>
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<p>1 determine if there is asbestos in a product?</p> <p>2 A. Not that I recall.</p> <p>3 Q. Have you published any</p> <p>4 peer-review articles regarding the use of --</p> <p>5 I'm just going to use the shorthand term --</p> <p>6 EDS, EDXA, to identify asbestos in materials?</p> <p>7 A. Not that I recall.</p> <p>8 Q. Have you ever authored a</p> <p>9 peer-review publication concerning the use of</p> <p>10 selected area diffraction -- selected area</p> <p>11 electron diffraction, SAED, to identify</p> <p>12 asbestos in materials?</p> <p>13 A. Not that I recall.</p> <p>14 Q. Have you ever published a</p> <p>15 peer-review paper regarding the use of</p> <p>16 polarized light microscopy, PLM, to</p> <p>17 distinguish between asbestos in talc in</p> <p>18 materials?</p> <p>19 A. Not that I recall.</p> <p>20 Q. Have you ever been asked by the</p> <p>21 United States Environmental Protection Agency</p> <p>22 to draft standards relating to the</p> <p>23 identification of asbestos in a material?</p> <p>24 A. No.</p> <p>25 Q. Have you or laboratories -- let</p>	<p>1 author of an American Society Testing and</p> <p>2 Materials method for the analysis of asbestos</p> <p>3 fibers and bundles in settled dust?</p> <p>4 A. No.</p> <p>5 Q. Have you ever been the primary</p> <p>6 author of any ASTM memorandum?</p> <p>7 A. No.</p> <p>8 Q. You cite to several different</p> <p>9 ISO memorandums relating to the</p> <p>10 identification of asbestos in either bulk</p> <p>11 samples or in the air or in talc, correct?</p> <p>12 A. Correct.</p> <p>13 Q. Have you ever been the author</p> <p>14 or a contributor to an ISO memorandum</p> <p>15 relating to the identification of asbestos in</p> <p>16 bulk samples?</p> <p>17 A. No.</p> <p>18 Q. Have you ever been the author</p> <p>19 or contributor to an ISO memorandum relating</p> <p>20 to the identification of asbestos in the air?</p> <p>21 A. No.</p> <p>22 Q. Have you ever been the author</p> <p>23 or contributor to an ISO memorandum relating</p> <p>24 to the identification of asbestos in talc?</p> <p>25 A. No.</p>

<p style="text-align: right;">Page 50</p> <p>1 Q. Have you ever tested a sample 2 of talc to determine whether or not it 3 contained asbestos? 4 A. No. 5 Q. Have you ever published 6 anything in any peer-reviewed journal about 7 testing talc to determine if it contains 8 asbestos? 9 A. No. 10 Q. What -- and I'm going to 11 butcher this word repeatedly because it's 12 just one of those words I just cannot say. 13 But what microscopy-based spectroscopic 14 methods have you used over the course of your 15 career? 16 A. Oh, Mössbauer spectroscopy, 17 electron spectroscopy of various kinds, TEM, 18 SEM, electron probe microanalysis, X-ray 19 diffraction, X-ray fluorescence, 20 proton-induced gamma emission, laser-induced 21 breakdown spectroscopy, Raman spectroscopy. 22 Those are some of them. 23 Q. Do you oversee a lab currently 24 that has electron microscopes? 25 A. No. The lab that contains an</p>	<p style="text-align: right;">Page 52</p> <p>1 two of them were -- happen to be those 2 standards. I don't recall. 3 Q. How many -- what is the primary 4 laboratory that you've worked with over the 5 past ten years? 6 Is it the Mount Holyoke? 7 A. My research takes place at many 8 different institutions. I work with the 9 synchrotron at the Advanced Photo Source, 10 Photon Source, in Chicago. I work with 11 scientists at Los Alamos National Laboratory, 12 and I work with scientists at the University 13 of Massachusetts in Amherst where I am on the 14 graduate faculty. 15 My own laboratory at Mount 16 Holyoke also includes many different kinds of 17 spectrometers. 18 Q. And your own laboratory at 19 Mount Holyoke has a SEM and a TEM now? 20 A. No. As I stated, Mount Holyoke 21 has an analytical facility for TEM and SEM, 22 which is under the direction of the director 23 of science center. 24 Q. And the science center is 25 affiliated with what entity?</p>
<p style="text-align: right;">Page 51</p> <p>1 SEM and TEM at Mount Holyoke is overseen by 2 the director of the science center. 3 Q. Do you have access to that lab? 4 A. Yes. 5 Q. Can you list the various types 6 of electron microscopes you have used to 7 analyze materials over the years? 8 A. You want to clarify what you 9 mean by "type"? 10 Q. Well, the manufacturer, the 11 model. 12 A. No, I don't pay attention to 13 that. I'd have to go back and look at the 14 papers. 15 Q. Are you aware that the National 16 Bureau of Standards publishes asbestos 17 standards? 18 A. Yes. 19 Q. Have you analyzed the National 20 Bureau of Standards asbes -- standard 21 asbestos samples in any laboratory where 22 you've worked? 23 A. I can't recall. I've analyzed 24 hundreds of thousands of samples in my 25 career, so it's difficult to recall if one or</p>	<p style="text-align: right;">Page 53</p> <p>1 A. All of the science departments 2 at the college. 3 Q. Okay. Do you know what NVLAP 4 NIST accredited means? 5 A. I know what NIST stands for. 6 Q. Do you know if any of the 7 laboratories you've worked in are NVLAP NIST 8 accredited? 9 A. So academic institutions are 10 accredited by completely differently 11 organizations than the ones that are used for 12 business entities. 13 And, yes, Mount Holyoke does 14 have an accreditation. 15 Q. Have you ever calibrated an 16 electron microscope for electron diffraction? 17 A. Probably 30 years ago, yes. 18 Q. You haven't done it in the past 19 30 years? 20 A. Our equipment is already kept 21 well-calibrated. We have a full-time 22 laboratory manager who takes care of the EMs. 23 Q. Have any of the labs that you 24 have worked with or for been in the NVLAP 25 NIST program for the identification of</p>

<p style="text-align: right;">Page 54</p> <p>1 asbestos?</p> <p>2 A. I have no knowledge of that.</p> <p>3 Q. How much time do you spend on a</p> <p>4 daily basis analyzing materials to determine</p> <p>5 whether or not they contain asbestos fibers?</p> <p>6 A. Zero.</p> <p>7 Q. How much time do you spend on a</p> <p>8 weekly basis analyzing materials to determine</p> <p>9 whether or not they contain asbestos?</p> <p>10 A. Zero.</p> <p>11 Q. How much time do you spend on a</p> <p>12 yearly basis analyzing materials to determine</p> <p>13 whether or not they contain asbestos?</p> <p>14 A. Zero.</p> <p>15 Q. What are the steps for</p> <p>16 identifying and assessing whether a sample of</p> <p>17 a material contains asbestos?</p> <p>18 A. Well, let's go back to my</p> <p>19 report where that's articulated quite</p> <p>20 clearly.</p> <p>21 So, for example, my report</p> <p>22 talks about the Yamate -- the Yamate document</p> <p>23 from the EPA, it talks about the ISO 22262</p> <p>24 document, and it also talks about PLM methods</p> <p>25 explained and described in the Su documents.</p>	<p style="text-align: right;">Page 56</p> <p>1 be reliable standards that a scientist should</p> <p>2 follow for analyzing whether or not a sample</p> <p>3 of a material contains asbestos?</p> <p>4 A. I would say that in the case of</p> <p>5 determination of bulk asbestos, the methods</p> <p>6 in those documents are robust.</p> <p>7 Q. What about for determining</p> <p>8 whether or not there is asbestos in talc?</p> <p>9 A. So those -- so Document 1, for</p> <p>10 example, which you mentioned, explicitly says</p> <p>11 it's for measurements of bulk samples, and</p> <p>12 Document Number 3, which is the one relating</p> <p>13 to X-ray diffraction, explicitly says that</p> <p>14 XRD has some limitations. And so ISO</p> <p>15 document 22262-2 is the only one that is</p> <p>16 really relevant to looking at small amounts</p> <p>17 of asbestos.</p> <p>18 Q. Okay. Do you regard the</p> <p>19 standard set forth in ISO 22262-2 to be</p> <p>20 reliable for a scientific -- a scientist to</p> <p>21 follow to analyze whether or not there are</p> <p>22 small amounts of asbestos in talc?</p> <p>23 A. You know, my goal in this</p> <p>24 report was to evaluate whether the</p> <p>25 methodology of Drs. Longo and Rigler was</p>
<p style="text-align: right;">Page 55</p> <p>1 So there are many different ways of answering</p> <p>2 that question.</p> <p>3 Q. Okay. Do you find the</p> <p>4 methodology set forth in ISO 22262-1 and</p> <p>5 22262-2 to be reliable standards that</p> <p>6 a scientist should follow for analyzing</p> <p>7 whether or not a sample of material contains</p> <p>8 asbestos?</p> <p>9 A. It would depend on -- the</p> <p>10 answer to that question would depend on the</p> <p>11 level of asbestos.</p> <p>12 So you want to be more</p> <p>13 specific?</p> <p>14 Q. Any level.</p> <p>15 A. Want to -- would you please</p> <p>16 restate the question?</p> <p>17 Q. Yes.</p> <p>18 Do you --</p> <p>19 MR. FINCH: Could you read back</p> <p>20 the question, madam court reporter?</p> <p>21 No? Okay. I'll see if I</p> <p>22 can...</p> <p>23 QUESTIONS BY MR. FINCH:</p> <p>24 Q. Do you find the methodology set</p> <p>25 forth in ISO standards 22262-1 and 22262-2 to</p>	<p style="text-align: right;">Page 57</p> <p>1 valid. It was not to evaluate whether the</p> <p>2 government documents on this topic are</p> <p>3 appropriate. So I have not thought about</p> <p>4 that.</p> <p>5 Q. Okay. So you don't -- you</p> <p>6 don't criticize the standards in -- or the</p> <p>7 methodology set forth in ISO 22262-2; is that</p> <p>8 correct?</p> <p>9 A. It's a government document. I</p> <p>10 haven't been asked to think about criticizing</p> <p>11 it, and so I haven't thought about it.</p> <p>12 MR. CHACHKES: And we've been</p> <p>13 going about an hour. If you reach a</p> <p>14 natural pausing point, we'll take</p> <p>15 maybe a little break.</p> <p>16 MR. FINCH: Okay. Let me go</p> <p>17 about another five minutes.</p> <p>18 MR. CHACHKES: Sure.</p> <p>19 QUESTIONS BY MR. FINCH:</p> <p>20 Q. When was the last sample that</p> <p>21 you analyzed that contained asbestos?</p> <p>22 A. What do you mean by "analyzed"?</p> <p>23 Q. Analyzed using any of the tools</p> <p>24 that a scientist could use to determine</p> <p>25 whether a substance or material contains</p>

<p style="text-align: right;">Page 58</p> <p>1 asbestos, either a PLM or TEM or any other 2 way. 3 A. I have in the past year 4 undertaken Mössbauer spectroscopy on asbestos 5 samples to determine their ferrous ratios, 6 but that is unrelated to the question of 7 determining whether asbestos is present or 8 not because I already knew that SAED samples 9 were asbestos. 10 Q. Okay. Do you recall when is 11 the last time you analyzed a sample where you 12 didn't know whether or not asbestos was 13 present to determine if, in fact, it 14 contained asbestos? 15 A. Never. 16 Q. Never done that? 17 A. No. 18 Q. You have -- I think I counted 19 this up right; maybe I missed one. 20 You have three publications 21 that deal with materials found in the 22 vermiculite from Libby, Montana; is that 23 right? 24 A. I contributed Mössbauer 25 analyses to three papers, yes. I did not</p>	<p style="text-align: right;">Page 60</p> <p>1 used to evaluate how much oxygen was 2 available at the time a mineral crystalized, 3 so in particular it's used to measure the 4 valent state of iron, whether it is oxidized 5 iron, which would be ferric iron, or reduced 6 iron, which would be ferrous iron. That is 7 one of my specialties. 8 Q. So one of your specialties is 9 using the Mössbauer analysis to determine, 10 for lack of a better word, the iron content 11 of something that might have asbestos in it? 12 A. One of my specialties is to use 13 Mössbauer spectroscopy to determine the iron 14 redux ratio of minerals among the 5,500 known 15 minerals. That's one of the specialties, 16 yes. 17 MR. FINCH: All right. This is 18 a good time to take a break. 19 VIDEOGRAPHER: The time is 20 10:05 a.m. Going off the record. 21 (Off the record at 10:05 a.m.) 22 VIDEOGRAPHER: We are back on 23 the record. The time is 10:21 a.m. 24 (Dyar Exhibits 4, 5, 6 and 7 25 marked for identification.</p>
<p style="text-align: right;">Page 59</p> <p>1 have anything to do with writing the papers. 2 Q. Okay. Your name appears on 3 those papers, right? 4 A. Correct. Because as is 5 appropriate in science, I contributed data to 6 the endeavor and, therefore, was included as 7 a coauthor. 8 Q. And Mickey Gunther is the lead 9 author on several -- on those papers, or is 10 at least an author on each of those papers? 11 A. I don't know. I'd have to 12 look, but I would presume so. 13 Q. So am I correct that you did 14 not analyze any of the material that came 15 from the vermiculite from Libby, Montana, to 16 determine whether or not it had asbestos in 17 it? 18 A. Correct. I only analyzed 19 things to determine the redux ratios. 20 Q. Okay. You mentioned something 21 called the Mössbauer spectrum? 22 A. Correct. 23 Q. All right. Could you describe 24 what that is? 25 A. A Mössbauer spectrometer is</p>	<p style="text-align: right;">Page 61</p> <p>1 QUESTIONS BY MR. FINCH: 2 Q. We're back on the record after 3 a short break. 4 Do you prefer to be called 5 Dr. Darby Dyar or Ms. Darby Dyar? 6 A. How about Professor Dyar. 7 Q. Okay. Professor Dyar. 8 I've marked and put in front of 9 both you and your lawyer copies of Darby Dyar 10 Exhibit 4, 5, 6 and 7. 11 A. Yes. 12 Q. And can you tell me what each 13 of those is? 14 A. So these documents are the air 15 quality testing International standard ISO 16 22262-1 and 2, and ISO 13794, as well as the 17 Yamate report from the EPA dated July 1984. 18 Q. Okay. 19 What is the International 20 Standard Organization? 21 A. I don't actually know. 22 Q. When is the first time you 23 reviewed or saw ISO 22262-1? This is Dyar 4. 24 A. When I saw it referenced in 25 Dr. Longo's report.</p>

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<p>1 Q. Okay. So you had never 2 previously had occasion in your career to 3 rely on the International standard for 4 sampling and qualitative determination of 5 asbestos in commercial bulk materials; is 6 that correct?</p> <p>7 A. In my research I use and have 8 used these techniques for almost 40 years, 9 but I have not yet brought them to bear on 10 the study of asbestos as an impurity in 11 talcum powder.</p> <p>12 Q. Okay. So you never had the -- 13 prior to your engagement by Johnson & Johnson 14 in this case, you never reviewed the 15 methodology set forth in ISO 22262-1; is that 16 correct?</p> <p>17 MR. LOCKE: Objection.</p> <p>18 THE WITNESS: Can you state the 19 question again?</p> <p>20 QUESTIONS BY MR. FINCH:</p> <p>21 Q. Yeah.</p> <p>22 Prior to being retained by 23 Johnson & Johnson as a potential expert in 24 these ovarian cancer cases, you never had 25 occasion to review ISO 22262-1 and the</p>	<p>1 ISO 22262-1 and ISO 22262-2 lay out the 2 methodology -- a methodology for a scientist 3 to follow in order to determine whether or 4 not for ISO 22262-1, whether or not there's 5 asbestos in commercial bulk materials, and 6 ISO 22262-2, whether there is asbestos in 7 talc?</p> <p>8 A. These two documents do describe 9 protocols for analyzing asbestos, yes.</p> <p>10 Q. And if an analyst follows those 11 protocols, would you criticize him or her for 12 doing so?</p> <p>13 A. So if we go back to my report, 14 we'll see numerous places where I talk about 15 the proper use of these tools for the 16 analysis of asbestos in amphibole.</p> <p>17 Q. But you're not criticizing the 18 methodology set forth in ISO 22262-1 or 19 22262-2; is that correct?</p> <p>20 A. Do you want to be more specific 21 by what you mean about methodology?</p> <p>22 Q. Yeah.</p> <p>23 The steps that they -- the 24 ISO -- let's say, ISO 222 -- you agree that 25 ISO 22262-1 and ISO 22262-2 lay out the steps</p>
Page 63	Page 65
<p>1 methodology that it lays out for 2 determination of asbestos in commercial bulk 3 materials; is that correct?</p> <p>4 MR. LOCKE: Objection.</p> <p>5 THE WITNESS: I have never 6 reviewed this specific document, but I 7 have reviewed countless times the use 8 of polarized light microscopy in the 9 detection and analysis of minerals.</p> <p>10 It's something I routinely teach and 11 it's something that I routinely use in 12 my research, but, again, not for the 13 purpose of detection of asbestos 14 specifically.</p> <p>15 QUESTIONS BY MR. FINCH:</p> <p>16 Q. Am I correct -- well, let me 17 just ask it.</p> <p>18 Have you ever reviewed ISO 19 Standard 22262-2 prior to your retention by 20 Johnson & Johnson in these cases?</p> <p>21 A. No. There was no need.</p> <p>22 MR. FINCH: Move to strike that 23 "there was no need."</p> <p>24 QUESTIONS BY MR. FINCH:</p> <p>25 Q. Would you agree with me that</p>	<p>1 that a scientist should follow and the tools 2 that the scientist should use to determine 3 whether or not there is asbestos in either a 4 bulk commercial material or in talc?</p> <p>5 A. I would say that they lay out 6 some of these steps that should be used, and 7 if done correctly, they would be useful. But 8 in my report, I talk about the possible 9 downside of many of these methods.</p> <p>10 So, for example, polarized 11 light microscopy, if done correctly, can be 12 useful in identifying minerals, but for the 13 possible -- and for the analysis of possible 14 impurities of -- in talcum powder, there are 15 many minerals that would have the same PLM 16 characteristics, so the results might well be 17 inconclusive.</p> <p>18 Q. Am I correct that ISO 22262-2 19 lays out a methodology and different tools 20 for a scientist to use to determine whether 21 or not there is asbestos in talc? Correct?</p> <p>22 A. So 22262, as it states --</p> <p>23 Q. Dash 2.</p> <p>24 A. Dash 2 -- talks about the use 25 of gravimetry and microscopic methods, and it</p>

<p style="text-align: right;">Page 66</p> <p>1 is designed to be used for quantitative 2 analysis of materials that are described on 3 the first page of that document's narrative. 4 Q. Which includes talc, correct? 5 A. Yes, mineral products such as 6 wollastonite, dolomite, calcite, talc or 7 vermiculite. 8 Q. And ISO 22262-2, in some 9 instances, refers back to ISO 22262-1 for how 10 to use the tools or analyze the data that one 11 obtains from using the tools to determine 12 whether what you were analyzing is asbestos 13 or not, correct? 14 A. Yes, these documents reference 15 one another and also other preexisting 16 documents. 17 Q. Okay. Are you familiar with 18 what I've marked as Dyar 6, ISO -- before I 19 get to Dyar 6, am I correct that the first 20 time you reviewed ISO 22262-1 or 22262-2 was 21 in connection with your work as a paid expert 22 work by Johnson & Johnson? 23 A. Yes. As a research scientist, 24 I have no need of anyone to tell me what -- 25 how to use these tools in my own research</p>	<p style="text-align: right;">Page 68</p> <p>1 report for the Environmental Protection 2 Agency? 3 A. That's my understanding, yes. 4 Q. Were you aware that Mr. Yamate 5 at one point worked for Bill Longo? 6 MR. CHACHKES: Objection. 7 THE WITNESS: I have no 8 knowledge of that. 9 QUESTIONS BY MR. FINCH: 10 Q. When is the first time that you 11 reviewed -- or can we just agree that we're 12 going to call Dyar 7 the Yamate report? 13 A. Sure. 14 Q. When's the first time you 15 reviewed the Yamate report? 16 A. For this particular case. 17 Q. You never reviewed it before 18 this? 19 A. No, it wasn't necessary because 20 I already know how to do electron microscopy, 21 as evidenced by my many peer-reviewed 22 publications that use the technique. 23 Q. And would you agree with me 24 that this Yamate report, Dyar 7, lays out 25 three different methodologies called level 1</p>
<p style="text-align: right;">Page 67</p> <p>1 because I've been trained to use these tools 2 over the course of my 40-year career, so 3 there was no need to consult a standard of 4 this sort. 5 Q. Have you ever reviewed or seen 6 ISO 13794 prior to your engagement by 7 Johnson & Johnson in these cases? 8 A. No, because I had no need for 9 instruction in how to use a TEM or how to do 10 point counting. I already know how to do 11 that in my research as affirmed by my 12 peer-reviewed publications. 13 Q. Are you familiar with Dyar 14 Exhibit 7? 15 A. Yes. 16 Q. What is Dyar Exhibit 7? 17 A. Dyar Exhibit 7 is a methodology 18 from George Yamate, written as an EPA report 19 in 1984. 20 Q. And what is the title of this 21 document? 22 A. The title of this document is 23 "Methodology for the Measurement of Airborne 24 Asbestos By Electron Microscopy." 25 Q. And this was a contracted</p>	<p style="text-align: right;">Page 69</p> <p>1 analysis, level 2 analysis and level 3 2 analysis for determining whether or not there 3 is asbestos in some kind of substance? 4 A. Yes, that's what it says. 5 Q. Do you have any opinion about 6 whether or not following these protocol would 7 be a reliable thing for a scientist to do in 8 analyzing whether there's asbestos in a 9 substance? 10 A. I have an opinion on the fact 11 that Dr. Longo did not follow this guideline. 12 He did not do any of the level 3 protocols 13 expressed in this, including reporting two 14 different zone axis SAED patterns. 15 Q. Am I correct you have not 16 reviewed any Johnson & Johnson internal 17 documents relating to testing it did of 18 either Johnson's baby powder or talc? 19 A. Correct, because my goal in 20 this investigation was to evaluate the 21 methodology of Drs. Longo and Rigler. 22 Q. My colleague, Mr. Geier, 23 pointed out that in the prior question I 24 asked you whether or not you have an opinion 25 about whether or not following the Yamate</p>

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<p>1 protocol would be a reliable thing for a 2 scientist to do in analyzing whether there's 3 asbestos in a substance. 4 And your answer was, "I have an 5 opinion on the fact that Dr. Longo did not 6 follow this guideline. He did not do any of 7 the level 3 protocols expressed in this, 8 including reporting two different zone axes 9 SAED patterns." 10 My question is a little bit 11 different. My question is, if a scientist 12 follows the Yamate level 3 protocol for the 13 number of samples or percentage of samples it 14 says to apply that protocol to, would you 15 have any criticism of the protocol itself as 16 a way for detecting asbestos in talc -- in 17 talc or any other substance? 18 A. Yes, I would have criticisms 19 because SAED only identifies which mineral 20 species it is. It does not say anything 21 about the morphology of the particle. 22 Q. Would you agree with me that 23 there are different tests to determine 24 whether or not there is asbestos in a sample 25 or substance?</p>	<p>1 to identify the mineral species that 2 is present. EDS is used to identify 3 the chemical composition of what is 4 present. Neither of those techniques 5 can tell you anything about the 6 morphology of the particle that is 7 present and, therefore, they are 8 not -- those two techniques together 9 could not tell you if asbestos was 10 present. 11 QUESTIONS BY MR. FINCH: 12 Q. What technique could -- isn't 13 it true that the morphology of the particle 14 is examining under a microscope and 15 determining things like the shape and size 16 and aspect ratio? 17 A. True. 18 So if SAED, in two different 19 zone axis determinations, were combined with 20 EDS analyses done properly, as -- as 21 expressed in my report, along with a survey 22 of the population of particle morphologies 23 present was undertaken, if all of those 24 things were true, then it would be possible 25 to identify something as asbestos.</p>
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<p>1 A. Certainly there are different 2 tests that determine the presence of 3 asbestos. 4 Q. Okay. One of them you 5 mentioned was SAED. 6 That's to determine the 7 crystalline structure, correct? 8 MR. CHACHKES: Objection. 9 THE WITNESS: SAED can be used 10 to determine the mineral species that 11 is present in the sample. It's used 12 in a very wide variety of 13 applications. It cannot prove that 14 something is asbestos. 15 QUESTIONS BY MR. FINCH: 16 Q. It cannot prove by itself that 17 something's asbestos, correct? 18 A. Correct. 19 Q. When used in conjunction with 20 other tools such as PLM or TEM, EDS, EDXA, 21 isn't it true that you can come to a 22 conclusion whether or not a given material is 23 asbestos? 24 MR. FROST: Objection. Form. 25 THE WITNESS: So SAED is used</p>	<p>1 Q. A survey of population of a 2 particle, what techniques would you use to do 3 that? 4 A. So in my report, if we go to 5 page -- let's see. It's the section 6 beginning on page 52. So it talks here about 7 the possibility of using a population of 8 particles and analyzing their size to 9 determine whether something is asbestos. 10 That's -- the word "population" 11 is also used in the R-93 document that I 12 reviewed, and populations are also referred 13 to in the ISO documents, although I can't, 14 without further time, tell you exactly which 15 one. 16 So in these -- in many of these 17 documents, they do refer to populations of 18 morphologies rather than individual ones. 19 Q. Are you aware that Mickey 20 Gunther has served as an expert witness for 21 multiple defendants in asbestos litigation 22 over the years? 23 MR. FROST: Objection. Form. 24 THE WITNESS: I'm aware that 25 Mickey has what he calls his lawyer</p>

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<p>1 work, yes.</p> <p>2 QUESTIONS BY MR. FINCH:</p> <p>3 Q. He's testified at the request</p> <p>4 of W.R. Grace, for example, in cases</p> <p>5 involving its asbestos-containing</p> <p>6 vermiculite?</p> <p>7 MR. CHACHKES: Objection.</p> <p>8 MR. FROST: Objection. Form.</p> <p>9 THE WITNESS: I'm not aware of</p> <p>10 exactly what Mickey does in his lawyer</p> <p>11 work.</p> <p>12 QUESTIONS BY MR. FINCH:</p> <p>13 Q. Are you aware that he always</p> <p>14 works for defendants in asbestos litigation</p> <p>15 and has never worked for a victim in asbestos</p> <p>16 litigation?</p> <p>17 MR. CHACHKES: Objection.</p> <p>18 MR. FROST: Objection.</p> <p>19 THE WITNESS: I am not aware of</p> <p>20 what Mickey does in his lawyer work.</p> <p>21 QUESTIONS BY MR. FINCH:</p> <p>22 Q. Have you ever asked him what he</p> <p>23 does in his lawyer work, as you call it?</p> <p>24 A. No.</p> <p>25 Q. When you submit a paper to a</p>	<p>1 is doing to assess the credibility of that</p> <p>2 work?</p> <p>3 A. I don't really have an opinion</p> <p>4 on that. I've never thought about it, to be</p> <p>5 honest.</p> <p>6 Q. So it was not important to you</p> <p>7 in your collaborations with Mickey Gunther to</p> <p>8 ever ask him whether or not he has only and</p> <p>9 exclusively worked at the request of asbestos</p> <p>10 defendants in asbestos litigation?</p> <p>11 MR. FROST: Objection.</p> <p>12 QUESTIONS BY MR. FINCH:</p> <p>13 Q. It never crossed your mind to</p> <p>14 ask him that question?</p> <p>15 MR. CHACHKES: Objection.</p> <p>16 THE WITNESS: It never crossed</p> <p>17 my mind to ask him that question.</p> <p>18 QUESTIONS BY MR. FINCH:</p> <p>19 Q. I asked if you reviewed any</p> <p>20 internal Johnson & Johnson documents relating</p> <p>21 to the testing of the talc from its mines or</p> <p>22 in its finished products, and I believe your</p> <p>23 answer was, no, you never reviewed any of</p> <p>24 those documents; is that correct?</p> <p>25 A. No, sir.</p>
Page 75	Page 77
<p>1 peer-review journal, isn't it correct that</p> <p>2 oftentimes the authors are asked if they have</p> <p>3 any potential conflicts of interest that may</p> <p>4 bias or affect their views of the material in</p> <p>5 which they publish?</p> <p>6 A. That's something that's started</p> <p>7 happening in the last few years, yes.</p> <p>8 Q. And why -- in your</p> <p>9 understanding, why has that started happening</p> <p>10 in the past few years?</p> <p>11 MR. LOCKE: Objection.</p> <p>12 THE WITNESS: I never thought</p> <p>13 about it.</p> <p>14 QUESTIONS BY MR. FINCH:</p> <p>15 Q. Do you think it has anything to</p> <p>16 do with the fact that the readers of the</p> <p>17 paper are entitled to know whether the</p> <p>18 authors of the paper have any financial</p> <p>19 interest in the subject matter on which they</p> <p>20 are writing about?</p> <p>21 A. I've never thought about it. I</p> <p>22 don't know.</p> <p>23 Q. Do you think it's important to</p> <p>24 know whether or not a scientist has a</p> <p>25 financial interest in the work that he or she</p>	<p>1 Q. Have you ever reviewed any</p> <p>2 documents relating to anyone else's testing</p> <p>3 of the talc in Johnson & Johnson's mines or</p> <p>4 the finished product, other than Longo and</p> <p>5 Rigler?</p> <p>6 A. No, although I did recall over</p> <p>7 the break that I reviewed some additional</p> <p>8 reports of Drs. Longo and Rigler that didn't</p> <p>9 have any numbers on them. So I reviewed them</p> <p>10 briefly and then set them aside, so those are</p> <p>11 cited in my report.</p> <p>12 But in terms of your current</p> <p>13 question, no other reports.</p> <p>14 Q. Okay. So the only people who</p> <p>15 have tested Johnson & Johnson baby powder or</p> <p>16 samples of talc from the mines where the talc</p> <p>17 came from for the baby powder, the only</p> <p>18 people that you reviewed the work of are</p> <p>19 Longo and Rigler; is that correct?</p> <p>20 MR. FROST: Objection.</p> <p>21 THE WITNESS: I was hired to</p> <p>22 review the methodology of Longo and</p> <p>23 Rigler, so that's what I did, yes.</p> <p>24 QUESTIONS BY MR. FINCH:</p> <p>25 Q. Did you think it was at all</p>

<p style="text-align: right;">Page 78</p> <p>1 important in analyzing the work of Longo and 2 Rigler to compare their results and 3 conclusions to what other scientists may have 4 found when they've analyzed the same 5 material -- or material from the same places? 6 MR. FROST: Objection. 7 THE WITNESS: No, it was not 8 important because I am very familiar 9 with the methodology that they use. 10 And there was really no need to look 11 and see what other people's work said 12 because that had nothing to do with my 13 review of the methodology. 14 QUESTIONS BY MR. FINCH: 15 Q. What is your definition of 16 asbestos? 17 A. My definition of asbestos is 18 given in my report. If we can turn to 19 page -- let's see, page 10. Asbestos is 20 defined as one of six particular minerals 21 exhibiting the characteristics of an 22 asbestiform habit, meaning that they can be 23 separated into flexible fibers with high 24 tensile strength. 25 And, of course, those six</p>	<p style="text-align: right;">Page 80</p> <p>1 Q. Have you ever done that? 2 A. I have certainly looked at the 3 tensile strength of mineral fibers. Not with 4 a TEM, however. 5 Q. How would you measure the 6 flexibility -- is there any -- is there any 7 peer-reviewed literature that you would rely 8 on or that you could cite me to that 9 describes how you would measure the tensile 10 strength of a fiber that is 10 microns long 11 or less? 12 A. I did not consider that because 13 that was not a method that was used by 14 Drs. Longo and Rigler. Given sufficient time 15 to research that topic, I'd be happy to give 16 you an answer. 17 Q. As you sit here today, you 18 can't think of any literature that lays out a 19 methodology to test the tensile strength of a 20 fiber that is 10 microns or less? 21 MR. FROST: Objection. 22 THE WITNESS: I would have to 23 do background research to answer that 24 question. 25</p>
<p style="text-align: right;">Page 79</p> <p>1 minerals are the ones given in the table and 2 in other places in the report, anthophyllite, 3 chrysotile, grunerite, tremolite, actinolite 4 and riebeckite. 5 Q. What is -- in your view qualify 6 a fiber as having the morphology that is 7 consistent with an asbestos fiber? 8 A. So again, my definition of a 9 fiber is given in the numerous literature 10 citations on page 10 and 11, which 11 consistently define fibers as being strong 12 and flexible and having high tensile 13 strength, including those in the ISO 22262, 14 which define asbestiform in an identical way 15 as a specific type of mineral fibrosity in 16 which the fibers and fibrils possess high 17 tensile strength and flexibility. 18 Q. Is it possible to measure the 19 tensile strength of a fiber that's 10 microns 20 long? 21 A. It is possible to constrain it 22 with a probe, yes. 23 Q. How would you do that? 24 A. You would poke the fiber and 25 see if it could bend.</p>	<p style="text-align: right;">Page 81</p> <p>1 QUESTIONS BY MR. FINCH: 2 Q. Have you ever mentioned -- ever 3 measured the tensile strength of asbestos? 4 A. Not personally, no. 5 Q. What is the unit of measurement 6 that that -- that one would use to measure 7 the tensile strength of asbestos? 8 A. I don't know, and I did not 9 consider that because a measurement of 10 tensile strength was not part of the 11 methodology of Drs. Longo and Rigler and, 12 therefore, it wasn't considered by me in 13 preparing this report. 14 Q. Do you know what a pascal joule 15 is? 16 A. Yes. 17 Q. What is it? 18 A. It's a unit of force. 19 Q. It's a unit of force that is 20 one way to measure -- it's a measurement that 21 you can calculate or determine the tensile 22 strength of a material, correct? 23 A. I'd have to research that to 24 make sure I -- I agree with you. I have no 25 knowledge of the exact methodology for</p>

<p style="text-align: right;">Page 82</p> <p>1 measuring tensile strength but could easily</p> <p>2 understand that with a brief survey of the</p> <p>3 literature.</p> <p>4 Q. Pounds per square inch is</p> <p>5 another way to measure tensile strength?</p> <p>6 A. Certainly.</p> <p>7 Q. What dimensions does a particle</p> <p>8 need to have in order for it to be</p> <p>9 potentially characterized as an asbestos</p> <p>10 fiber?</p> <p>11 MR. FROST: Objection.</p> <p>12 THE WITNESS: So the answer to</p> <p>13 that question refers -- or depends on</p> <p>14 which guidelines you're looking at.</p> <p>15 QUESTIONS BY MR. FINCH:</p> <p>16 Q. In your view. In your opinion.</p> <p>17 A. I have no personal opinion in</p> <p>18 this matter. I just know what the different</p> <p>19 documents can tell you.</p> <p>20 Q. So you have no opinion as to</p> <p>21 what aspect ratio must be present in order</p> <p>22 for something to be characterized as having</p> <p>23 morphology that is consistent with asbestos?</p> <p>24 MR. LOCKE: Objection.</p> <p>25 Misstates testimony.</p>	<p style="text-align: right;">Page 84</p> <p>1 QUESTIONS BY MR. FINCH:</p> <p>2 Q. Yes.</p> <p>3 A. So as I said in my report, EDS</p> <p>4 and EDXA do not let -- do not have sufficient</p> <p>5 quantitative accuracy to allow discrimination</p> <p>6 between potentially asbestiform and</p> <p>7 non-asbestiform mineral species, many of</p> <p>8 which have very similar compositions, as</p> <p>9 given in Table 1 in my report.</p> <p>10 Q. Do you agree with me that</p> <p>11 information from an EDS, EDXA chemical</p> <p>12 signature can be useful to determine whether</p> <p>13 or not a given structure is asbestos or not</p> <p>14 if used in connection with other tools?</p> <p>15 MR. FROST: Objection.</p> <p>16 THE WITNESS: I believe that</p> <p>17 EDS can be used to determine the</p> <p>18 presence or absence of specific</p> <p>19 elements, but it cannot be used to</p> <p>20 make quantitative judgments on the</p> <p>21 ratios of the concentrations of those</p> <p>22 elements.</p> <p>23 That's not only my opinion but</p> <p>24 the opinion of Newbury and Ritchie and</p> <p>25 the National Institute of Standards</p>
<p style="text-align: right;">Page 83</p> <p>1 MR. FROST: Objection.</p> <p>2 MR. CHACHKES: Objection.</p> <p>3 THE WITNESS: My assessment of</p> <p>4 the literature suggests that aspect</p> <p>5 ratio is best understood in the</p> <p>6 context of a population, and the</p> <p>7 papers by Ann Wylie and others that I</p> <p>8 reference in my report talk about</p> <p>9 amphibole populations.</p> <p>10 And so my personal opinion is</p> <p>11 that analysis of populations is the</p> <p>12 optimal way to understand asbestos,</p> <p>13 but that is -- that is the preliminary</p> <p>14 opinion, and I'd want to think about</p> <p>15 it and do some research on it.</p> <p>16 My personal opinion did not</p> <p>17 come up in this particular report.</p> <p>18 QUESTIONS BY MR. FINCH:</p> <p>19 Q. In order for a structure to</p> <p>20 meet your definition of asbestos, what does</p> <p>21 the EDS or EDXA chemical signature have to</p> <p>22 be?</p> <p>23 MR. FROST: Objection.</p> <p>24 THE WITNESS: You said EDS and</p> <p>25 EDXA chemical signature have to be?</p>	<p style="text-align: right;">Page 85</p> <p>1 and Technology and numerous other</p> <p>2 scientists.</p> <p>3 QUESTIONS BY MR. FINCH:</p> <p>4 Q. Do you agree that SAED is a</p> <p>5 useful tool to determine whether or not a</p> <p>6 particle or structure has a crystalline</p> <p>7 structure that when used in conjunction with</p> <p>8 other tools allows you to determine whether</p> <p>9 or not it's asbestos or not?</p> <p>10 A. SAED is a tool that allows you</p> <p>11 to determine what the crystal structure of</p> <p>12 the particle is. You would need other</p> <p>13 information to determine whether the particle</p> <p>14 was asbestos.</p> <p>15 Q. How would you measure the</p> <p>16 flexibility of an asbestos fiber that is</p> <p>17 10 microns or less in length?</p> <p>18 MR. FROST: Objection. Asked</p> <p>19 and answered.</p> <p>20 MR. FINCH: No, I asked about</p> <p>21 tensile strength.</p> <p>22 THE WITNESS: So I would</p> <p>23 imagine that you would use a probe,</p> <p>24 but I would have to do some more</p> <p>25 research. And I can certainly do</p>

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<p>Page 86</p> <p>1 that, but not -- I don't have an</p> <p>2 opinion on that at the present time.</p> <p>3 QUESTIONS BY MR. FINCH:</p> <p>4 Q. You've never used a probe to</p> <p>5 determine the flexibility of an asbestos</p> <p>6 fiber under a microscope?</p> <p>7 A. No, that has never been</p> <p>8 necessary in my research. I've analyzed many</p> <p>9 amphiboles and certainly many minerals that</p> <p>10 are asbestos, but it was apparent</p> <p>11 microscopically that those phases were</p> <p>12 asbestos -- or they were identified to me as</p> <p>13 such, so that I had no need to verify them by</p> <p>14 testing their flexibility.</p> <p>15 Q. And so am I correct that ISO</p> <p>16 22262-1 and ISO 22262-2 don't set forth any</p> <p>17 steps or methodologies that a scientist or</p> <p>18 analyst should follow to determine either the</p> <p>19 tensile strength or the flexibility of a</p> <p>20 fiber that is being analyzed under either of</p> <p>21 those protocols?</p> <p>22 A. You know, I'd have to go back</p> <p>23 and re-read them with that question in mind.</p> <p>24 I would be happy to take the time to do that.</p> <p>25 I don't recall.</p>	<p>Page 88</p> <p>1 Vermont?</p> <p>2 A. No. None.</p> <p>3 Q. So you don't have any</p> <p>4 understanding as to whether the talc in</p> <p>5 Vermont came from the Hammondsville mine, the</p> <p>6 Hamm mine, the Rainbow mine or the Argonaut</p> <p>7 mine?</p> <p>8 MR. FROST: Objection.</p> <p>9 THE WITNESS: Or anywhere else,</p> <p>10 no.</p> <p>11 (Dyar Exhibit 8 marked for</p> <p>12 identification.)</p> <p>13 QUESTIONS BY MR. FINCH:</p> <p>14 Q. Let's mark this as Exhibit 8.</p> <p>15 This is Dr. Longo's second</p> <p>16 supplemental report, which is dated</p> <p>17 February 1, 2019.</p> <p>18 Professor Dyar, Darby Dyar,</p> <p>19 have you seen -- you've obviously reviewed</p> <p>20 Dr. Longo's report in the backup materials</p> <p>21 dated January 16th, correct?</p> <p>22 A. Yes, I've typed all these</p> <p>23 numbers into a spreadsheet.</p> <p>24 Q. Okay. And did you also review</p> <p>25 the February 1st report which contained a</p>
<p>Page 87</p> <p>1 Q. You don't know whether they do</p> <p>2 or not as you sit here today?</p> <p>3 A. I don't recall.</p> <p>4 Q. What is your understanding of</p> <p>5 what mines Johnson & Johnson got its talc</p> <p>6 from?</p> <p>7 MR. FROST: Objection.</p> <p>8 THE WITNESS: All I know is</p> <p>9 that they came from China -- hang on,</p> <p>10 let me find my figure -- and Vermont</p> <p>11 and another place, which I don't</p> <p>12 recall.</p> <p>13 QUESTIONS BY MR. FINCH:</p> <p>14 Q. Do you have the chronology as</p> <p>15 to when Johnson & Johnson got its talc from</p> <p>16 Vermont versus when it got its talc from</p> <p>17 China versus when it got its talc from Italy?</p> <p>18 A. Yes, I believe those data are</p> <p>19 noted in my spreadsheet, and I believe that</p> <p>20 the data themselves are in the Longo and</p> <p>21 Rigler reports. I can't recall exactly where</p> <p>22 they came from.</p> <p>23 Q. Do you have an understanding of</p> <p>24 how many different mines Johnson & Johnson</p> <p>25 got talc from that went into baby powder from</p>	<p>Page 89</p> <p>1 couple of corrections to his earlier report?</p> <p>2 A. I believe so, yes.</p> <p>3 Q. Okay. I'm going to use -- I'm</p> <p>4 not going to mark the entire 2,000-page</p> <p>5 January report as an exhibit to save trees.</p> <p>6 I think we all know that's the report that</p> <p>7 you were looking at when you wrote your</p> <p>8 expert witness report, correct?</p> <p>9 A. One of the reports, yes.</p> <p>10 Q. On page 8 of Dr. Longo's</p> <p>11 report, which we've marked as Darby Dyar 8 --</p> <p>12 let me know when you're there.</p> <p>13 A. I'm there.</p> <p>14 Q. Under ATEM, four pages down --</p> <p>15 four paragraphs down, Drs. Longo and Rigler</p> <p>16 state, "Two different regulated amphibole</p> <p>17 asbestos types were found. These were the</p> <p>18 tremolite asbestos solid solution series</p> <p>19 amphiboles, which includes tremolite,</p> <p>20 winchite, richterite and actinolite, and the</p> <p>21 anthophyllite asbestos solid solution series</p> <p>22 that includes anthophyllite, iron-rich</p> <p>23 anthophyllite, ferro-anthophyllite,</p> <p>24 cummingtonite and grunerite."</p> <p>25 Do you see that?</p>

23 (Pages 86 to 89)

<p style="text-align: right;">Page 90</p> <p>1 A. I see that that's what the 2 report says, yes. 3 Q. Okay. What is the 4 anthophyllite asbestos solid solution series? 5 A. So if you return to my 6 document, Table 1 has a handy table with 7 those mineral formulas in it. 8 So if you look at the formula 9 of anthophyllite, which is $Mg_7(Si_8O_{22})(OH)_2$, 10 you see it's a solid solution with some other 11 amphiboles in this list that include iron, 12 such as grunerite. 13 Q. And what does that mean? 14 A. It means that there can be a 15 continuous range of chemical substitution 16 between those two end numbers. 17 Q. And do you know whether all the 18 materials in the anthophyllite asbestos solid 19 solution series are treated as regulated 20 asbestos or not? 21 MR. FROST: Objection. Form. 22 THE WITNESS: I know that the 23 six stated regulated amphibole 24 asbestos species are the ones given in 25 my report.</p>	<p style="text-align: right;">Page 92</p> <p>1 cummingtonite and grunerite, correct? 2 A. I'd have to look up -- look 3 that up. I'm sure that the amphibole 4 chemistries are so complicated -- as you will 5 recall from my report, there are some 80-odd 6 amphibole species with solid solutions 7 intermixed among them. 8 So, yes, these species are all 9 related, but so are many other amphibole 10 species as well. 11 Q. Are you familiar with Klein and 12 Hurlbut's Manual of Mineralogy? 13 A. Yes. 14 Q. What is that? 15 A. It's a very old mineralogy 16 textbook. 17 (Dyar Exhibit 9 marked for 18 identification.) 19 QUESTIONS BY MR. FINCH: 20 Q. Let's mark this as Exhibit 9. 21 On page 489 of Exhibit 9, there 22 is a diagram there. 23 MR. FINCH: And can I have the 24 Elmo -- 25 VIDEOGRAPHER: Sure.</p>
<p style="text-align: right;">Page 91</p> <p>1 QUESTIONS BY MR. FINCH: 2 Q. My question was a little 3 different. 4 Do you know if the -- all of 5 the materials in the anthophyllite asbestos 6 solid solution series are treated as 7 regulated asbestos? 8 MR. FROST: Objection. 9 MR. CHACHKES: Objection. 10 THE WITNESS: I'm telling you 11 that what I know is that the regulated 12 asbestos species are the ones given in 13 my report. 14 QUESTIONS BY MR. FINCH: 15 Q. One of which is anthophyllite, 16 correct? 17 A. Yes, as IARC 2012 identifies 18 them, the five amphibole minerals: 19 actinolite, amosite, anthophyllite, 20 crocidolite and tremolite. 21 Q. Okay. My question is a little 22 bit different. 23 The anthophyllite asbestos 24 solid solution series includes anthophyllite, 25 iron-rich anthophyllite, ferro-anthophyllite,</p>	<p style="text-align: right;">Page 93</p> <p>1 MR. FINCH: -- so people who 2 are not privy to the document can see 3 what I'm talking about? 4 THE WITNESS: So what year was 5 this particular edition of Hurlbut and 6 Klein published? 7 MR. FINCH: Sometime in the 8 1980s, I believe, but -- 9 THE WITNESS: So this would not 10 include the revision of amphibole 11 nomenclature that was approved by the 12 International Mineralogical Society, 13 or association, I don't know, sometime 14 in the '80s by Hawthorne, et al., in 15 which the amphibole nomenclature was 16 extensively rewritten. So this 17 definition in these documents are 18 significantly out of date. 19 QUESTIONS BY MR. FINCH: 20 Q. Okay. My question is: Do you 21 know whether or not cummingtonite, 22 ferro-anthophyllite, iron-rich anthophyllite 23 and grunerite are treated as regulated 24 asbestos by the United States EPA, OSHA or 25 any other governmental organization?</p>

<p style="text-align: right;">Page 94</p> <p>1 MR. CHACHKES: Objection. 2 MR. FROST: Objection. 3 THE WITNESS: I am only aware 4 of these six amphibole species given 5 in my report to be regulated asbestos 6 minerals. 7 QUESTIONS BY MR. FINCH: 8 Q. Do you agree that iron-rich 9 anthophyllite is found in the anthophyllite 10 asbestos solid solution series? 11 A. If indeed that is still the 12 name of the mineral species -- I'm inferring 13 what you mean by that -- I would say that 14 possibly it would be part of the solid 15 solution series. 16 Q. Am I correct that cummingtonite 17 and anthophyllite have the same chemical 18 structure? 19 A. All amphiboles have the same 20 chemical structure in many ways. There are 21 slight deviations depending on the 22 composition. 23 Q. All right. 24 A. So just as all the other end 25 amphibole minerals in the amphibole group</p>	<p style="text-align: right;">Page 96</p> <p>1 MR. CHACHKES: Objection. 2 MR. FROST: Objection. 3 THE WITNESS: My goal in 4 reviewing this report was to examine 5 the methodology. My goal was not to 6 opine on amphibole regulations. 7 QUESTIONS BY MR. FINCH: 8 Q. I take it you have no opinion 9 as to whether cummingtonite can cause 10 mesothelioma or ovarian cancer if it's 11 inhaled? 12 MR. FROST: Objection. 13 THE WITNESS: I have no 14 opinion. 15 QUESTIONS BY MR. FINCH: 16 Q. Would you agree with me that -- 17 let me back up. 18 Do you know what accessory 19 minerals were found in talc from the Vermont 20 mines from which Johnson & Johnson obtained 21 the talc for its baby powder? 22 MR. FROST: Objection to form. 23 THE WITNESS: No, I have no 24 idea. 25</p>
<p style="text-align: right;">Page 95</p> <p>1 have the same structure, yes, they have the 2 same structure. 3 Q. Okay. Looking at Table 1 on 4 page 9 of your report, am I correct that 5 anthophyllite and cummingtonite have the 6 exact same chemical makeup in terms of the 7 chemical formula? 8 A. That is correct. 9 Q. All right. Do you know whether 10 cummingtonite is treated as regulated 11 asbestos by any governmental or international 12 organization? 13 MR. CHACHKES: Objection. 14 THE WITNESS: I am aware only 15 of the six regulated amphibole -- or 16 six regulated asbestos -- potential 17 asbestiform minerals that are given in 18 my report. 19 QUESTIONS BY MR. FINCH: 20 Q. So is the answer to my 21 question, no, you don't know one way or the 22 other whether cummingtonite is treated as a 23 subset of anthophyllite for regulatory 24 purposes? 25 MR. LOCKE: Objection.</p>	<p style="text-align: right;">Page 97</p> <p>1 QUESTIONS BY MR. FINCH: 2 Q. Do you know what accessory 3 minerals are typically found in talc mines? 4 MR. FROST: Objection. Form. 5 THE WITNESS: No, I have no 6 idea. I am familiar in the general 7 sense with the rock types, metamorphic 8 rock types, in which talc occurs. I 9 know it's a low-grade metamorphic 10 mineral, but that's -- I know nothing 11 specifically about Vermont. 12 QUESTIONS BY MR. FINCH: 13 Q. Can talc be contaminated with 14 asbestos? 15 MR. FROST: Objection to form. 16 THE WITNESS: I have no opinion 17 on that. I'd have to research that 18 question. 19 QUESTIONS BY MR. FINCH: 20 Q. From what parts of the world 21 has talc been found to be contaminated with 22 asbestos? 23 MR. FROST: Objection. 24 THE WITNESS: Based on the 25 information in my report and the</p>

<p style="text-align: right;">Page 98</p> <p>1 samples tested by Drs. Longo and 2 Rigler, there is no evidence to 3 suggest that any samples tested by 4 Drs. Longo and Rigler are contaminated 5 with asbestos. 6 QUESTIONS BY MR. FINCH: 7 Q. That's not my question. 8 From what parts of the world 9 has talc been found to be contaminated with 10 asbestos, as discussed in either the 11 peer-reviewed literature or in publications 12 by entities such as IARC? 13 MR. LOCKE: Objection. 14 MR. FROST: Objection. 15 THE WITNESS: I have no 16 knowledge of that because I was not 17 asked to review talc paragenesis. I 18 was asked to review methodology only. 19 QUESTIONS BY MR. FINCH: 20 Q. You mentioned IARC in response 21 to one of my questions a few minutes ago. 22 What is that? 23 A. It's yet another international 24 standard report. I'd have to take a look at 25 that report to give you a more specific</p>	<p style="text-align: right;">Page 100</p> <p>1 mined in Vermont. 2 Q. Do you have -- do you agree or 3 disagree that talc mines in Vermont have been 4 found to contain asbestos? 5 MR. FROST: Objection. 6 MR. LOCKE: Objection. 7 THE WITNESS: Based on my 8 reading of the data in Drs. Longo and 9 Rigler's reports, there is no evidence 10 to suggest that there is any asbestos 11 in any of the talcum powder samples 12 they studied, some of which I 13 understand are from Vermont. 14 QUESTIONS BY MR. FINCH: 15 Q. Do you agree or disagree that 16 talc mines in Vermont owned by Johnson & 17 Johnson or its subsidiary, Windsor Minerals, 18 have been tested and found to contain trace 19 amounts of asbestos? 20 MR. CHACHKES: Objection. 21 THE WITNESS: I have no 22 knowledge of that. Please support 23 your supposition. 24 (Dyar Exhibit 10 marked for 25 identification.)</p>
<p style="text-align: right;">Page 99</p> <p>1 answer. 2 Q. Do you understand that IARC is 3 the International Agency for Research on 4 Cancer? 5 A. I had no idea that's what it 6 stood for. I don't recall that from when I 7 reviewed the report. 8 Q. Were you aware that IARC 9 concluded that talc contaminated with 10 asbestiform fibers can cause mesothelioma and 11 other asbestos-related cancers? 12 MR. FROST: Objection to form. 13 THE WITNESS: I'm not aware of 14 that. If it was in the report, I 15 don't recall it. I was specifically 16 reading the report for relevance to my 17 methodology inquiries. 18 QUESTIONS BY MR. FINCH: 19 Q. Do you agree or disagree that 20 asbestos was mined in Vermont? 21 A. Assuming that the information 22 that was given to me was correct, then I 23 think some of the talcum powder samples that 24 I studied were mined in Vermont, but I have 25 no knowledge of whether asbestos was found or</p>	<p style="text-align: right;">Page 101</p> <p>1 QUESTIONS BY MR. FINCH: 2 Q. Professor Darby Dyar, have -- 3 you've seen this publication before, correct? 4 A. I have seen this paper, yes. I 5 believe I cited it, 1991, yes. 6 Q. When did you first review this 7 publication? 8 A. For the purposes of assessing 9 the so-called Blount method cited by 10 Dr. Longo. 11 Q. All right. The title of the 12 paper is "Amphibole Content of Cosmetic and 13 Pharmaceutical Talcs"? 14 A. That is correct. That is the 15 title. 16 Q. And this was published in a 17 peer-reviewed journal and describes a 18 methodology for preparing talc in order to 19 analyze whether or not there's asbestos 20 fibers or asbestos bundles in it, correct? 21 A. Its goal is to determine the 22 number of amphibole particles in a sample, 23 yes. 24 Q. And the author analyzes various 25 samples of talc under PLM, correct?</p>

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<p>1 A. So give me a few minutes, and 2 I'll take a look at this paper and refresh my 3 memory so I can answer your question. 4 So in this case, these samples 5 are being analyzed on a microscope slide, 6 which implies that in fact he is using 7 polarized light microscopy, yes, although in 8 point of fact he doesn't state that. 9 Q. You mean that it's Alice 10 Blount. She -- 11 A. Well, she does not state that. 12 Sorry, Alice. 13 Q. Are you aware of the origin of 14 the samples that Professor Blount was 15 testing? 16 A. It says five deposits in 17 Montana, three in Vermont, and one each in 18 North Carolina and Alabama. 19 Q. And also finished products, 20 correct? 21 A. That's what it says here: In 22 addition, four talcs from outside the US but 23 available on the US market were included in 24 this study. 25 Q. Have you reviewed Dr. Blount's</p>	<p>1 QUESTIONS BY MR. FINCH: 2 Q. Okay. You don't offer any 3 criticisms of either the chain of custody or 4 the conclusion that what he was, in fact, 5 analyzing was talc that came from either 6 Johnson & Johnson finished products or the 7 mines from which Johnson & Johnson finished 8 products were made? 9 MR. FROST: Objection. 10 THE WITNESS: I would say that 11 it is unclear to me whether the 12 samples he got were from eBay, whether 13 they had been opened, whether they had 14 been contaminated, so it's unclear to 15 me exactly what he was testing. 16 I know what he asserts in his 17 report, but I -- it's unclear to me 18 that he was testing unopened, pure, 19 pristine talc as marketed. 20 QUESTIONS BY MR. FINCH: 21 Q. Were you aware that there was a 22 procedure in this MDL for samples to be split 23 between Johnson & Johnson and Dr. Longo from 24 historical museum samples that Johnson & 25 Johnson had maintained?</p>
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<p>1 deposition taken in connection with ovarian 2 cancer litigation? 3 A. No. 4 Q. Have you reviewed Dr. Blount's 5 correspondence with Johnson & Johnson where 6 she tells Johnson & Johnson she identified 7 asbestos fibers in baby powder? 8 MR. FROST: Objection. 9 THE WITNESS: No, I have not 10 reviewed such a document. 11 QUESTIONS BY MR. FINCH: 12 Q. Dr. Longo -- let me see if you 13 agree with this description of generally the 14 various steps that Dr. Longo and his lab 15 followed to analyze the samples of talc he 16 obtained from Johnson & Johnson or Imerys. 17 First of all, he got samples of 18 talc from either Johnson & Johnson or Imerys. 19 Do you have that understanding? 20 MR. CHACHKES: Objection. 21 THE WITNESS: I honestly don't 22 recall where he said he got them. I 23 recall seeing a chain-of-custody 24 paperwork. I wasn't paying attention 25 to where he got the samples from.</p>	<p>1 MR. FROST: Objection. 2 THE WITNESS: Yes, certainly 3 one of the documents is called 4 historical samples, so I'm aware that 5 the samples came from the museum and, 6 therefore, are unknown sources in 7 terms of being opened or being pure. 8 QUESTIONS BY MR. FINCH: 9 Q. But you don't criticize or take 10 issue with Dr. Longo's conclusions that what, 11 in fact, he is testing is talc that came from 12 Johnson & Johnson finished products or 13 Johnson & Johnson mines, correct? 14 MR. CHACHKES: Objection. 15 MR. FROST: Objection. 16 THE WITNESS: I do indeed have 17 problems with that statement because 18 you don't know if those samples, 19 having been stored in a museum or in 20 someone's cupboard, were opened and 21 exposed to contamination. So I don't 22 know that. 23 QUESTIONS BY MR. FINCH: 24 Q. Well, you certainly didn't 25 comment upon it in your report, correct?</p>

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<p>1 A. It wasn't relevant to my 2 question of whether the methodology that he 3 used to analyze the samples was appropriate 4 or not.</p> <p>5 Q. All right. So he got the 6 samples from Johnson & Johnson in this 7 litigation, the samples that are analyzed in 8 his February 1, 2019 report. And then for 9 many of the samples, he used what is called 10 the Blount preparation method, correct?</p> <p>11 A. That is correct.</p> <p>12 Q. All right. I read through your 13 report, and I didn't see any criticisms 14 related to the way in which he applied the 15 Blount preparation method to prepare the 16 samples for analysis; is that correct?</p> <p>17 MR. LOCKE: Objection.</p> <p>18 THE WITNESS: Correct, there is 19 nothing in my report that criticizes 20 his use of the Blount method.</p> <p>21 QUESTIONS BY MR. FINCH:</p> <p>22 Q. Do you agree that use of the 23 Blount method to prepare a talc sample in 24 order to analyze whether or not it's 25 contaminated with asbestos is a reasonable</p>	<p>1 and talc out for purposes of analyzing 2 whether or not they contain asbestos?</p> <p>3 A. It certainly contains something 4 that indicate -- tells how to separate out 5 things with different densities, and it talks 6 specifically about asbestos.</p> <p>7 And I note that the refractive 8 index, or the density, of the liquid that 9 they say to use is different than the one 10 used in the Blount paper. One is 1 point -- 11 I don't remember, but they're different.</p> <p>12 So Dr. Longo did not follow 13 what's in the ISO report. He followed what's 14 in the Blount report.</p> <p>15 Q. He reviewed what's in the 16 Blount peer-reviewed paper, correct?</p> <p>17 A. He used the 1.610, I believe, 18 density method.</p> <p>19 Q. Were you aware that the Blount 20 paper was cited in the IARC publication you 21 were referring to earlier relating to talc 22 with asbestiform fibers?</p> <p>23 MR. FROST: Objection.</p> <p>24 THE WITNESS: I don't recall 25 that.</p>
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<p>1 and reliable thing for a scientist to do in 2 testing talc for the presence of asbestos?</p> <p>3 A. I actually would say I do not 4 agree with that. In fact, I do not agree 5 with the results in the Blount paper.</p> <p>6 For example, Figure 1 in 7 Blount's paper which -- or Figure 2, which 8 purports to give the specific gravities of 9 talc and amphibole, is just simply wrong. 10 Those ranges are far wider and far more 11 overlapping than she is apparently 12 knowledgeable of.</p> <p>13 So in my mind, the simple fact 14 that the densities of these minerals overlap 15 each other a great degree renders the Blount 16 method to be difficult to use, at best.</p> <p>17 Q. But you didn't, in your report, 18 criticize Dr. Longo's use of the Blount 19 method; is that correct?</p> <p>20 A. In my written report I did not 21 state that criticism, no.</p> <p>22 Q. Okay. And am I correct that 23 ISO 22262-2 describes a gravimetric --</p> <p>24 A. Gravimetric, yes.</p> <p>25 Q. -- method to separate materials</p>	<p>1 QUESTIONS BY MR. FINCH:</p> <p>2 Q. Do you agree with me that IARC 3 generally only cites to reputable papers in 4 its work?</p> <p>5 MR. FROST: Objection.</p> <p>6 MR. CHACHKES: Objection.</p> <p>7 THE WITNESS: I have no 8 independent knowledge of IARC, so I 9 can't really answer that question.</p> <p>10 QUESTIONS BY MR. FINCH:</p> <p>11 Q. Nonetheless, the Blount 12 methodology as described in her paper was 13 published in a peer-reviewed journal, 14 correct?</p> <p>15 A. I've never encountered this 16 journal before, but I'm assuming that if it's 17 called a journal, it is indeed peer reviewed. 18 But I'd have to corroborate that. I don't 19 know anything about this journal. It's not a 20 highly ranked journal.</p> <p>21 Q. What systematic study have you 22 done to determine whether Environmental 23 Health Perspectives is ranked highly or not 24 ranked highly?</p> <p>25 MR. CHACHKES: Objection.</p>

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<p>1 THE WITNESS: It would be a 2 simple matter to log on to the Web of 3 Science and determine the rating of 4 that journal, but I have not done 5 that. I'm not in the habit of 6 establishing the ratings on all the 7 papers that I read. 8 I am very familiar with the 9 premier journals in the subject of 10 mineralogy, and that's not one of 11 them. 12 QUESTIONS BY MR. FINCH: 13 Q. Would you agree with me there 14 are many different disciplines of science 15 that bear on the question of what is 16 asbestos? 17 MR. FROST: Objection. Vague. 18 MR. CHACHKES: Objection. 19 THE WITNESS: No, I wouldn't 20 agree with that. 21 I would say that the definition 22 of asbestos is fairly straightforward, 23 as given in my report, and it is 24 firmly grounded in both mineralogy and 25 the other fields that are cited.</p>	<p>1 deposition. 2 MR. CHACHKES: By the way, 3 we've been going about an hour. Maybe 4 at some point take a break. 5 QUESTIONS BY MR. FINCH: 6 Q. Do you agree or disagree that 7 the most common asbestos mineral found as a 8 contaminant of talc is tremolite asbestos? 9 MR. FROST: Objection. Form. 10 THE WITNESS: No, I do not 11 agree with that. I have no knowledge 12 of that. In fact, based on the Longo, 13 Rigler reports, I have no evidence 14 that suggests that any asbestos 15 minerals are found in talc. 16 QUESTIONS BY MR. FINCH: 17 Q. Do you have an opinion one way 18 or another as to whether talc can be 19 contaminated with anthophyllite asbestos or 20 tremolite asbestos when it is mined out of 21 the ground? 22 MR. LOCKE: Objection. 23 THE WITNESS: I know nothing 24 about mining practices. I'm not a 25 mining geologist, so I have no opinion</p>
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<p>1 QUESTIONS BY MR. FINCH: 2 Q. At the end of page 230 in her 3 paper, Dr. Blount writes that "In addition, 4 the tendency to bring down a disproportionate 5 number of larger particles has the advantage 6 that with true asbestiform amphiboles one 7 generally sees some particles showing bundles 8 of fibrils, which removes any doubt about the 9 nature of the amphibole." 10 Do you see that? 11 A. I see that the paper says that, 12 yes. 13 Q. Do you agree that if you find 14 bundles of fibrils that are amphibole in 15 nature, it makes it more likely than not that 16 what you're looking at is asbestiform 17 amphibole? 18 A. No, I do not agree with that 19 statement. 20 Q. Why not? 21 A. First of all, you'd need to 22 define "bundle." And to my knowledge, the 23 way asbestos is deformed -- defined does not 24 include the term "bundle," as stated in the 25 definition I've given previously in this</p>	<p>1 on that. 2 QUESTIONS BY MR. FINCH: 3 Q. You have no opinion about 4 whether or not the -- you haven't reviewed 5 all of the data that exists in the world as 6 to testing done on Johnson's baby powder or 7 the talc that went into Johnson's baby powder 8 to determine whether or not it contained 9 asbestos, correct? 10 MR. LOCKE: Objection. 11 MR. CHACHKES: Objection. 12 THE WITNESS: My role here was 13 to evaluate the methodology used by 14 Drs. Longo and Rigler, so such an 15 assertion would be far, far outside of 16 what I researched and was asked to do. 17 QUESTIONS BY MR. FINCH: 18 Q. Okay. You are a geologist by 19 training, correct? 20 A. Correct. 21 Q. As a matter of geology, do you 22 agree with me that talc can be contaminated 23 with accessory minerals, minerals that are 24 not talc? 25 A. Of course.</p>

<p style="text-align: right;">Page 114</p> <p>1 Q. You agree with me --</p> <p>2 A. Metamorphic rocks that contain</p> <p>3 talc often have other minerals in them, yes.</p> <p>4 Q. You agree that talc can be</p> <p>5 contaminated with anthophyllite asbestos?</p> <p>6 MR. FROST: Objection.</p> <p>7 THE WITNESS: I have no</p> <p>8 specific knowledge of the assemblages</p> <p>9 that are stable with talc. I only</p> <p>10 know that it's a low-grade metamorphic</p> <p>11 mineral, but I know nothing about the</p> <p>12 other phases that are present. I'm</p> <p>13 not a metamorphic geologist.</p> <p>14 QUESTIONS BY MR. FINCH:</p> <p>15 Q. So you don't know one way or</p> <p>16 another whether or not talc can be</p> <p>17 contaminated with anthophyllite asbestos; is</p> <p>18 that fair?</p> <p>19 MR. LOCKE: Objection.</p> <p>20 THE WITNESS: I have no</p> <p>21 knowledge of the natural parageneses</p> <p>22 of talc, beyond the fact that it's a</p> <p>23 low-grade metamorphic mineral.</p> <p>24 QUESTIONS BY MR. FINCH:</p> <p>25 Q. Do you agree or disagree with</p>	<p style="text-align: right;">Page 116</p> <p>1 which determines in part whether it's</p> <p>2 monoclinic or orthorhombic. And I would also</p> <p>3 use polarized light microscopy on multiple</p> <p>4 grains to determine the -- in part the</p> <p>5 chemistry of the particle. And then I would</p> <p>6 sample populations of particles to determine</p> <p>7 them in an ideal sense.</p> <p>8 But this would be only</p> <p>9 something I would do in the laboratory, in</p> <p>10 the sort of -- in a careful study with my</p> <p>11 students.</p> <p>12 Q. Okay. So you would -- you</p> <p>13 mentioned you would use multiple zone axis</p> <p>14 analysis.</p> <p>15 You're talking about SAED,</p> <p>16 correct?</p> <p>17 A. Correct.</p> <p>18 Q. So you would use -- one tool</p> <p>19 you would use is an electron microscope,</p> <p>20 correct?</p> <p>21 A. Uh-huh. Yes.</p> <p>22 Q. Then you would do EDS, EDXA, to</p> <p>23 determine the chemistry, the elemental</p> <p>24 chemistry, of a material, correct?</p> <p>25 A. I would use it to determine</p>
<p style="text-align: right;">Page 115</p> <p>1 the fact that talc can be contaminated with</p> <p>2 anthophyllite asbestos or tremolite asbestos?</p> <p>3 MR. CHACHKES: Objection.</p> <p>4 THE WITNESS: I disagree with</p> <p>5 that. I don't know that that's a</p> <p>6 fact, and I have not researched that</p> <p>7 personally, so I have no opinion on</p> <p>8 it. But I do not certainly consider</p> <p>9 it a fact.</p> <p>10 QUESTIONS BY MR. FINCH:</p> <p>11 Q. What tools would you use to</p> <p>12 test a sample of talc to determine if it</p> <p>13 contains asbestos?</p> <p>14 A. Again, I was not asked to rule</p> <p>15 on that, but if I were to do testing, I would</p> <p>16 probably follow some combination of the Su</p> <p>17 protocols and those articulated in the Yamate</p> <p>18 document, which was exhibit whatever.</p> <p>19 Q. What are the tools that you</p> <p>20 would use?</p> <p>21 I'm not asking about the</p> <p>22 protocols you would follow. What tools?</p> <p>23 A. I would ideally use multiple</p> <p>24 zone axis determinations combined with EDS to</p> <p>25 rule out or confirm the presence of calcium,</p>	<p style="text-align: right;">Page 117</p> <p>1 whether or not calcium was present, yes.</p> <p>2 Q. All right. And that is, again,</p> <p>3 using a transmission electron microscope,</p> <p>4 correct?</p> <p>5 A. Or an SEM, yes.</p> <p>6 Q. And does it matter in which</p> <p>7 order that you would do steps 1 and 2,</p> <p>8 meaning would you first -- does it matter</p> <p>9 whether you first analyze it using EDS, EDXA,</p> <p>10 or whether you first analyze it using SAED?</p> <p>11 A. I would think it would not --</p> <p>12 it certainly doesn't matter.</p> <p>13 Q. The third step, you said, would</p> <p>14 be to analyze it using a polarized light</p> <p>15 microscope, correct?</p> <p>16 A. Yes.</p> <p>17 Q. Does it matter in which order</p> <p>18 you would analyze it using a polarized light</p> <p>19 microscope?</p> <p>20 Meaning would you do SAED or an</p> <p>21 EDS before or after the PLM, or does it not</p> <p>22 matter?</p> <p>23 A. Well, you presumably wouldn't</p> <p>24 be able to do it on the same particle because</p> <p>25 the PLM is usually done on a microscope slide</p>

<p style="text-align: right;">Page 118</p> <p>1 and the TEM is done on a grid. So order is</p> <p>2 kind of irrelevant since it's different</p> <p>3 particles.</p> <p>4 Q. Different particles from the</p> <p>5 same sample?</p> <p>6 A. Yes.</p> <p>7 Q. Then presumably you would have</p> <p>8 photomicrographs of the particle that you're</p> <p>9 examining from the electron microscope,</p> <p>10 either images via TEM or SEM, correct?</p> <p>11 A. In this hypothetical situation,</p> <p>12 yes.</p> <p>13 Q. I mean, this hypothetical</p> <p>14 situation is I'm asking you to analyze a</p> <p>15 sample of talc to determine whether it has</p> <p>16 asbestos in it. You would take pictures with</p> <p>17 your electron microscope that are called</p> <p>18 photomicrographs to determine what the</p> <p>19 structure looked like visually, correct?</p> <p>20 MR. LOCKE: Objection.</p> <p>21 THE WITNESS: Well, in point of</p> <p>22 fact, you could also take</p> <p>23 photomicrographs with a polarized</p> <p>24 light microscope.</p> <p>25</p>	<p style="text-align: right;">Page 120</p> <p>1 yeah, there are written protocols</p> <p>2 about that.</p> <p>3 And, of course, basic polarized</p> <p>4 light microscope use is written up</p> <p>5 in -- ubiquitously in textbooks,</p> <p>6 including the outdated one that you</p> <p>7 gave me a section of.</p> <p>8 MR. CHACHKES: So I asked for a</p> <p>9 break about ten minutes ago. Are we</p> <p>10 getting near a point where we can</p> <p>11 break?</p> <p>12 MR. FINCH: Yeah. Two more</p> <p>13 questions.</p> <p>14 MR. CHACHKES: Okay.</p> <p>15 QUESTIONS BY MR. FINCH:</p> <p>16 Q. So you mentioned the tools that</p> <p>17 you would use would be to take your sample</p> <p>18 and, using an electron microscope, perform</p> <p>19 SAED and EDS, EDXA, on it; then use a</p> <p>20 polarized light microscope to analyze a</p> <p>21 different particle in the same sample.</p> <p>22 Correct?</p> <p>23 MR. FROST: Objection.</p> <p>24 Misstates testimony.</p> <p>25 MR. CHACHKES: Objection.</p>
<p style="text-align: right;">Page 119</p> <p>1 QUESTIONS BY MR. FINCH:</p> <p>2 Q. And --</p> <p>3 A. If the particles are big</p> <p>4 enough.</p> <p>5 Q. Right.</p> <p>6 And in those photomicrographs,</p> <p>7 either using TEM or PLM, you have a picture</p> <p>8 of the structure that you're analyzing,</p> <p>9 correct?</p> <p>10 A. You have a two-dimensional</p> <p>11 image of a particle viewed from one angle,</p> <p>12 yes.</p> <p>13 Q. And is it left to -- is there</p> <p>14 any written protocol or peer-reviewed</p> <p>15 literature that tells an analyst or scientist</p> <p>16 what it is to photograph or when to take the</p> <p>17 photomicrograph of the particle, either by</p> <p>18 PLM or TEM or SEM?</p> <p>19 MR. FROST: Objection.</p> <p>20 THE WITNESS: Well, for</p> <p>21 example, if you look in the Su paper</p> <p>22 that I've cited here, it talks pretty</p> <p>23 specifically about exactly how you</p> <p>24 would rotate the grain and examine it</p> <p>25 from different perspectives. So,</p>	<p style="text-align: right;">Page 121</p> <p>1 THE WITNESS: By definition, if</p> <p>2 you look at something on a polarized</p> <p>3 light microscope, generally speaking</p> <p>4 you're looking at something on a glass</p> <p>5 slide, not a TEM grid, yes.</p> <p>6 So if you're going to do</p> <p>7 multiple analyses of that sort, you</p> <p>8 would be using different particles</p> <p>9 from the same sample.</p> <p>10 QUESTIONS BY MR. FINCH:</p> <p>11 Q. And then you would have</p> <p>12 populations of -- an analysis of populations</p> <p>13 of particles?</p> <p>14 A. If you analyzed enough samples</p> <p>15 as is recommended in many of these protocols,</p> <p>16 you would have -- you could have --</p> <p>17 potentially have a population, yes.</p> <p>18 MR. FINCH: Okay. This is a</p> <p>19 good stopping point.</p> <p>20 VIDEOGRAPHER: Okay. Stand by,</p> <p>21 please. Remove your microphones. The</p> <p>22 time is 11:31 a.m. Off the record.</p> <p>23 (Off the record at 11:31 a.m.)</p> <p>24 VIDEOGRAPHER: Okay. We are</p> <p>25 back on the record. The time is</p>

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<p>1 11:47 a.m. 2 QUESTIONS BY MR. FINCH: 3 Q. Have you ever done any 4 consulting work for Johnson & Johnson prior 5 to your engagement in this case? 6 A. No. 7 Q. Have you ever done any 8 consulting work for Imerys, Imerys Talc 9 America, Imerys NA or any of their affiliated 10 companies prior to your engagement by Johnson 11 & Johnson in this case? 12 A. No. 13 Q. Have you ever done any 14 consulting work for Colgate-Palmolive? 15 A. No. 16 Q. Have you ever done any 17 consulting work for W.R. Grace? 18 A. No. 19 Q. Have you ever done any 20 consulting work for the RJ Lee Group? 21 A. No. 22 Q. Have you ever done any 23 consulting work for Scotts fertilizer 24 company? 25 A. No.</p>	<p>1 Q. In the -- I believe I might 2 have asked you this before, but I'm not sure 3 I remember the answer to it. 4 Have you ever tested an NIST 5 reference sample of asbestos using EDS, EDXA 6 to determine what the EDS spectra looks like 7 for tremolite or anthophyllite? 8 A. No, but that wouldn't be 9 necessary. EDS is a fairly basic technique. 10 You could even synthesize the spectrum of 11 those minerals and determine what they looked 12 like, so it wouldn't be necessary to do it 13 myself personally. 14 Q. Would you agree with me that 15 the transmission electron microscope, when it 16 analyzes a reference samples of asbestos 17 using EDS or EDXA, will -- is capable to 18 print out an EDS spectra from that microscope 19 that shows what the chemical makeup of the 20 reference sample of asbestos is? 21 A. Certainly an EDS spectrum can 22 show you the presence or absence of 23 particular elements, and it can give you a 24 rough sense of how much of each is present. 25 Q. In the third bullet point you</p>
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<p>1 Q. Have you ever done any 2 consulting work for BNSF Railway? 3 A. No. 4 Q. Have you ever been engaged to 5 test vermiculite or to determine whether or 6 not it contains asbestos? 7 A. No. 8 Q. Have you ever been hired by any 9 entity to test a vermiculite-finished product 10 to determine if it contains asbestos? 11 A. No. 12 Q. Have you ever been hired by any 13 governmental entity to test any substance to 14 determine whether it contains asbestos? 15 A. No. 16 Q. Have you ever been retained by 17 any company that either mined talc or sold 18 talc-containing finished products to analyze 19 whether or not it contains asbestos? 20 A. No. 21 Q. All right. On page 1 of your 22 report, you're talking about EDS mineral 23 chemistry, correct, at the bottom of the 24 page? 25 A. Yes.</p>	<p>1 state, at the bottom of the page, "They," 2 referring to Longo and Rigler, "deliberately 3 choose not to generate quantitative numbers 4 that would more accurately determine the 5 chemical compositions, which is the very 6 purpose of an EDS analysis of an unknown 7 mineral." 8 Do you see that? 9 A. Yes. I wrote that. 10 Q. What generally accepted 11 standards require the printout of 12 quantitative data similar to Figure 7 in your 13 report in order for a scientist or analyst to 14 analyze the chemical structure of a mineral 15 to determine whether it's consistent with 16 asbestos or not? 17 A. That was a big mouthful. Let 18 me review that sentence. 19 So as articulated by Newbury 20 and Ritchie in their report about EDS 21 spectroscopy and doing it accurately, it is 22 important to do the calculations based on the 23 peak areas with the appropriate corrections 24 in order to get even semi-quantitative data 25 out of an EDS spectrum.</p>

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<p>Page 126</p> <p>1 Q. Does anything in ISO 22262-1 or 2 22262-2 or Yamate require the quantitative 3 data like that shown in Figure 7 be generated 4 in order for an analyst to analyze the 5 chemical structure of a particle that could 6 be asbestos? 7 A. I don't recall. I'd have to go 8 back and review them. But I'm guessing that 9 because 22262 is about microscopic methods 10 and 222-1 {sic} is about polarizing light 11 microscopy, that neither one of them has much 12 to say about EDS. I honestly don't recall 13 which of those ISO documents talks about EDS. 14 Q. Isn't it true that ISO 22262-1 15 has an extensive discussion of analysis by 16 TEM, quantitative analysis by TEM, of -- 17 qualitative analysis by TEM of EDXA spectra? 18 A. As I said, I did not recall 19 that, but I have it in my hand now and I'll 20 be happy to take a look. 21 Q. Page 33. 22 A. Yes, I see it talks about -- 23 MR. FINCH: Can I have the 24 Elmo? 25 THE WITNESS: -- qualitative</p> <p>Page 127</p> <p>1 analysis by TEM, yes. 2 QUESTIONS BY MR. FINCH: 3 Q. All right. Can you point me to 4 any ISO standard or anywhere in Yamate where 5 it says that it's necessary for an analyst to 6 have quantitative data like that shown in 7 Figure 7 in your report in order to analyze 8 the chemical structure of an asbestos 9 mineral? 10 A. So the definition of asbestos 11 requires that a mineral be one of the 12 specific six regulated mineral species. And 13 in order to determine if a mineral is among 14 the six regulated mineral species, it is 15 necessary to know the chemical composition 16 and the crystal structure, as I describe in 17 my report. 18 Therefore, it follows that it 19 would be useful to know the chemical 20 composition in order to confirm whether one 21 of the six regulated mineral species is 22 present. And as articulated here, the TEM 23 analysis is only qualitative. 24 Q. And am I correct that in 25 Yamate, for example, it states, "Energy-</p>	<p>Page 128</p> <p>1 dispersive X-ray analysis as used in asbestos 2 analysis is semi-quantitative at best"? 3 Do you see that? 4 A. That is correct, but -- 5 Q. Do you agree with that? 6 A. But let me point out that in 7 his deposition, Dr. Longo says very 8 specifically that it's quantitative, and that 9 is exactly what I'm disagreeing with. 10 Q. Are you aware of any ISO 11 standard or EPA publication that requires the 12 printout of quantitative data like you have 13 in Figure 7 in your report in order to 14 analyze the X-ray spectra of an asbestos -- 15 or potentially asbestos chemical? 16 A. I am aware that analysis of ISO 17 standards and under EPA requirements require 18 that the mineral species be identified. And 19 in order to identify the mineral species, it 20 is necessary to have a quantitative -- as 21 quantitative as possible chemical analysis. 22 Q. Isn't it true that ISO 22262-1 23 says nowhere that you have to have a 24 quantitative analysis, or the quantitative 25 printouts like you have in Figure 7 in your</p> <p>Page 129</p> <p>1 report, in order to do a valid analysis of 2 the chemical spectra of an asbestos particle? 3 A. It is true that ISO 22262-1 4 indicates that the asbestos is defined as one 5 of specific mineral species. And so in order 6 to determine if something is among a specific 7 mineral species, you would have to know the 8 chemical composition. 9 Q. But it doesn't require you to 10 have quantitative data in the level of detail 11 that you show in Exhibit 7 to determine the 12 chemical structure of the mineral, correct? 13 A. It would be the chemical 14 composition of a mineral. 15 Q. The chemical composition of the 16 mineral? 17 A. It requires that you know the 18 chemical composition well enough to identify 19 the sample as one of the six regulated 20 mineral species. 21 Q. And do you have any view one 22 way or another whether the analysts in 23 Dr. Longo's lab, or Dr. Longo himself, is 24 sufficiently familiar with the chemical 25 composition of the six regulated types of</p>
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<p>1 asbestos that they can determine based on</p> <p>2 looking at a semi-quantitative EDXA spectra</p> <p>3 whether or not the material they're looking</p> <p>4 at has a chemical signature consistent with</p> <p>5 asbestos?</p> <p>6 A. I would say absolutely not,</p> <p>7 they do not have -- because it's impossible</p> <p>8 to look at -- no matter how many thousands of</p> <p>9 EDS spectra you've looked at, it is</p> <p>10 impossible to look at an EDS spectrum and,</p> <p>11 without analyzing it, obtain quantitative</p> <p>12 data as Dr. Longo purports to do.</p> <p>13 Q. Okay. In ISO 22262-1 -- do you</p> <p>14 have that?</p> <p>15 A. Got it.</p> <p>16 Q. You can do EDS, EDXA, by SEM or</p> <p>17 TEM, correct?</p> <p>18 A. Depends on the instrument, yes.</p> <p>19 Q. All right. Would you turn to</p> <p>20 Annex F.</p> <p>21 A. Yes.</p> <p>22 Q. All right. Would you agree</p> <p>23 with me that pages 58, 59, 60, 61, 62 all</p> <p>24 show EDS, EDXA spectra for samples of</p> <p>25 tremolite, anthophyllite and the other</p>	<p>1 A. No, sir. It says on --</p> <p>2 MR. LOCKE: Objection.</p> <p>3 THE WITNESS: -- page 1 of this</p> <p>4 document that this document is</p> <p>5 appropriate for the analysis of -- the</p> <p>6 quantitative -- qualitative analysis</p> <p>7 identification of asbestos in specific</p> <p>8 types of manufactured</p> <p>9 asbestos-containing products and</p> <p>10 commercial minerals.</p> <p>11 So I would say that these</p> <p>12 patterns have been developed for use</p> <p>13 in situations where you already know</p> <p>14 that what is present is asbestos, and</p> <p>15 you're trying to determine which of</p> <p>16 the six asbestos minerals is present,</p> <p>17 which is clearly not the case in the</p> <p>18 study of talc.</p> <p>19 QUESTIONS BY MR. FINCH:</p> <p>20 Q. Would you agree with me, or do</p> <p>21 you know, whether or not insulation can be</p> <p>22 asbestos-containing or non-asbestos-</p> <p>23 containing?</p> <p>24 MR. CHACHKES: Objection.</p> <p>25 THE WITNESS: I don't know</p>
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<p>1 asbestos varieties?</p> <p>2 A. That is what this document</p> <p>3 claims to show, yes.</p> <p>4 Q. And you agree with me that</p> <p>5 nowhere in these printouts of what the</p> <p>6 chemical signature is using EDS, EDXA, does</p> <p>7 it have quantitative data like that shown in</p> <p>8 Figure 7 in your report?</p> <p>9 A. It is correct that those are</p> <p>10 not given; however, in the case of these</p> <p>11 reference standards, these have been</p> <p>12 independently analyzed for chemistry and,</p> <p>13 therefore, the chemistry is already known.</p> <p>14 And there is no need to determine the</p> <p>15 chemistry by this semi-quantitative EDXA</p> <p>16 analytical method, which is why it probably</p> <p>17 isn't shown here.</p> <p>18 Q. Isn't it the case that what</p> <p>19 this ISO 22262-1 is all about is determining</p> <p>20 when you've got a bulk material where you</p> <p>21 don't know whether it has asbestos or not in</p> <p>22 it, to do an EDS or EDXA to compare the data</p> <p>23 you get from the bulk material to the</p> <p>24 standard EDS, EDXA spectrum contained in</p> <p>25 Annex F?</p>	<p>1 anything about that.</p> <p>2 QUESTIONS BY MR. FINCH:</p> <p>3 Q. Okay. Would you agree with me,</p> <p>4 or do you know, whether ISO 22262 can be used</p> <p>5 to test insulation, where you don't know</p> <p>6 whether it has asbestos in it or not, to</p> <p>7 determine whether or not the bulk material</p> <p>8 that you're looking at contains asbestos?</p> <p>9 A. I believe it says</p> <p>10 asbestos-containing insulation.</p> <p>11 And it goes on to talk about --</p> <p>12 in the introduction about asbestos-containing</p> <p>13 insulation. For example, "A large proportion</p> <p>14 of the chrysotile product produced was used</p> <p>15 in asbestos cement products. Materials</p> <p>16 containing high proportions of chrysotile</p> <p>17 asbestos were used in buildings and in</p> <p>18 industry."</p> <p>19 So that's what it says here.</p> <p>20 Q. Isn't it true that in the scope</p> <p>21 on page 1 of the document, this part of ISO</p> <p>22 22262 specifies methods for sampling bulk</p> <p>23 materials and identification of asbestos in</p> <p>24 commercial bulk materials?</p> <p>25 It doesn't say anything about</p>

<p style="text-align: right;">Page 134</p> <p>1 asbestos-containing bulk materials, correct?</p> <p>2 A. It indeed says it specifies</p> <p>3 methods for sampling bulk materials and</p> <p>4 identification of asbestos in commercial bulk</p> <p>5 asbestos. That's what it says here, yes.</p> <p>6 Q. All right. Do you have the</p> <p>7 understanding one way or another that this is</p> <p>8 the methodology a scientist should follow if</p> <p>9 he has a bulk material of insulation that he</p> <p>10 doesn't know whether it has asbestos in it or</p> <p>11 not, to follow this methodology to determine</p> <p>12 whether there's asbestos in the material or</p> <p>13 not?</p> <p>14 A. To which methodology are you</p> <p>15 referring? The entire document?</p> <p>16 Q. ISO -- yes.</p> <p>17 A. This document and the extended</p> <p>18 versions 2 and 3 are intended for that</p> <p>19 purpose. That's what it says they're</p> <p>20 intended for.</p> <p>21 Q. Okay. Would you agree with me</p> <p>22 that Annex F has the X-ray spectra for</p> <p>23 tremolite on page 61?</p> <p>24 A. It does include spectra of</p> <p>25 samples of these minerals, yes. Certainly</p>	<p style="text-align: right;">Page 136</p> <p>1 analysis where it specifically focuses on the</p> <p>2 example of asbestos. I believe it's level 3.</p> <p>3 Let me see if I can find that.</p> <p>4 Sorry, what was your question?</p> <p>5 Q. My question is, isn't the</p> <p>6 entire Yamate protocol something that is used</p> <p>7 to determine whether or not asbestos is in a</p> <p>8 material or not?</p> <p>9 A. Well, the title of the document</p> <p>10 is "Methodology for Measurement of Airborne</p> <p>11 Asbestos By Electron Microscopy."</p> <p>12 So the level 3 as specified in</p> <p>13 this document details the use of quantitative</p> <p>14 SAED analysis from two different zone axis</p> <p>15 orientations, et cetera, et cetera.</p> <p>16 Q. Right.</p> <p>17 But before you get to</p> <p>18 quantitative level 3 analysis, you do level 2</p> <p>19 analysis, correct?</p> <p>20 A. That's correct.</p> <p>21 Q. And level 2 analysis, you're</p> <p>22 trying to determine whether or not there is</p> <p>23 asbestos in the material or not, correct?</p> <p>24 May have asbestos in it, may not?</p> <p>25 A. At -- at significant -- at</p>
<p style="text-align: right;">Page 135</p> <p>1 these are not necessarily representative of</p> <p>2 all possible examples of these minerals, but</p> <p>3 they are individual standard reference</p> <p>4 materials of these particular individuals</p> <p>5 {sic}.</p> <p>6 Q. Are you aware whether tremolite</p> <p>7 was ever used as part of any -- an</p> <p>8 asbestos-containing product, intentionally</p> <p>9 designed to be part of an asbestos-containing</p> <p>10 product?</p> <p>11 MR. FROST: Objection.</p> <p>12 THE WITNESS: I have no</p> <p>13 knowledge of that.</p> <p>14 QUESTIONS BY MR. FINCH:</p> <p>15 Q. Do you recognize the Yamate</p> <p>16 method as a method to analyze -- to determine</p> <p>17 whether or not there is or is not asbestos in</p> <p>18 either a bulk sample or in the air?</p> <p>19 A. The Yamate method is, strictly</p> <p>20 speaking, a method for measurement of</p> <p>21 airborne asbestos.</p> <p>22 Q. And is it part of the method to</p> <p>23 determine whether or not -- whether asbestos</p> <p>24 is there or not?</p> <p>25 A. So let's take a look at level 3</p>	<p style="text-align: right;">Page 137</p> <p>1 significant levels, yes.</p> <p>2 Q. And it doesn't require the</p> <p>3 analyst, in looking at an EDS, EDXA spectrum,</p> <p>4 to have the quantitative data like that shown</p> <p>5 in Figure 7 in your report to determine the</p> <p>6 chemical composition of the material he or</p> <p>7 she is analyzing, correct?</p> <p>8 A. Well, in point of fact, level 2</p> <p>9 is level 1 plus chemical analysis. And it</p> <p>10 says that -- in level 2 you're talking about</p> <p>11 a process of elimination used to categorize</p> <p>12 amphibole fibers, identify the ambiguous</p> <p>13 fibers in concern or validate level of</p> <p>14 chrysotile fibers. So it all builds.</p> <p>15 What was your question?</p> <p>16 Q. My question is, is there</p> <p>17 anything in the Yamate document that requires</p> <p>18 an analyst to have quantitative data like</p> <p>19 Figure 7 in your report for the EDS, EDXA</p> <p>20 analysis he or she performs on a material to</p> <p>21 determine whether its chemical composition is</p> <p>22 consistent with asbestos?</p> <p>23 A. Well, I guess maybe read the</p> <p>24 question again here.</p> <p>25 The Yamate document is about</p>

<p style="text-align: right;">Page 138</p> <p>1 confirming whether it's one of the specific 2 asbestos mineral species. And so to the 3 extent that it is necessary to have chemical 4 analysis to determine whether something is 5 one of the species, then, yes, it does imply 6 that you need to have quantitative EDS data. 7 Q. Where? Where? Point me to 8 where it says you have to have quantitative 9 EDS data. 10 A. It says that you need to 11 identify a specific -- whether a specific 12 asbestiform or potentially asbestiform 13 mineral species is present. And to me, that 14 implies that you need to know what the 15 chemistry is because otherwise you couldn't 16 tell. 17 Q. And isn't it correct that at 18 page 39 of the document it states, 19 "Energy-dispersive X-ray analysis, as used in 20 asbestos analysis, is semi-quantitative at 21 best"? 22 A. Absolutely, yes. 23 Q. And it says nowhere in here 24 that you have to have quantitative EDS or ED 25 X-ray analysis.</p>	<p style="text-align: right;">Page 140</p> <p>1 report. 2 Q. Published in the peer-reviewed 3 literature? 4 A. Not a commonly cited journal, 5 but, yes. 6 Q. In this journal, he reports EDS 7 data from various materials in Figures 5, 6, 8 8? 9 A. Yes. 10 Q. And in the EDS data he reports, 11 for example, in Figure 6, three SEM 12 photographs with associated EDS data of 13 amphiboles found in soils in Washington, DC, 14 southern Illinois, western Montana. Based on 15 EDS data, particles A and B would be 16 tremolite, actinolite, and C would be 17 anthophyllite, grunerite. 18 Do you see that? 19 A. He just says based on EDS data; 20 he doesn't say based on the EDS data shown. 21 So my inference from this figure caption 22 would be that he calculated the mineral 23 compositions and drew those conclusions. 24 Now, he does not say that he's 25 basing his conclusions about composition on</p>
<p style="text-align: right;">Page 139</p> <p>1 Can you point to me anywhere in 2 this document where it says must have a 3 quantitative data like that shown in 4 Exhibit 7 {sic} in your report? 5 A. So I would say that nowhere in 6 this document does it says that you must have 7 a quantitative printout, but certainly that 8 information is necessary to determine whether 9 something is a particular composition. 10 So again, referring back to my 11 report, the goal of Drs. Longo and Rigler is 12 to confirm the presence of one of the six 13 regulated asbestiform -- potentially 14 asbestiform minerals and whether or not they 15 are present in the talcum powder. And the 16 EDS data that are presented in there do not 17 come anywhere close to determining that. 18 MR. FINCH: Can I have the 19 Gunther paper? 20 (Dyar Exhibit 11 marked for 21 identification.) 22 QUESTIONS BY MR. FINCH: 23 Q. This is a paper by Mickey 24 Gunther that you cite in your report? 25 A. Yes, I use the figures in my</p>	<p style="text-align: right;">Page 141</p> <p>1 the basis of these images alone. 2 Q. Does it say anywhere in the 3 paper that he calculated the quantitative EDS 4 measurement? 5 A. He doesn't need to. It is -- 6 it is extraordinarily rare for someone to 7 acquire an EDS pattern and not calculate the 8 composition. So you would only need to 9 mention that if you didn't calculate the 10 composition. 11 Q. Does it say anywhere in this 12 paper that you -- that he calculated -- he 13 did some kind of quantitative analysis -- 14 first of all, let's get very clear. 15 Nothing in this peer-reviewed 16 paper has the kind of quantitative data 17 relating to an EDS spectrum like that shown 18 in Figure 7 in your report, correct? 19 MR. CHACHKES: Objection. 20 THE WITNESS: I would want to 21 make sure there isn't some supplement 22 that gives those numbers, but 23 certainly in these five pages of this 24 document he doesn't give the 25 quantitative numbers. However, he</p>

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<p>1 does state that based on EDS data, 2 these particles would be assigned 3 these compositions. 4 So again, the norm when doing 5 analysis with EDS is that you 6 calculate the compositions. It would 7 be extraordinary that he would have to 8 go out of his way to not print them 9 out, which is, in fact, what 10 Drs. Longo and Rigler do. They must 11 have disabled the default command to 12 output compositions. 13 QUESTIONS BY MR. FINCH: 14 Q. You say the norm. 15 You haven't pointed me to a 16 single document, either ISO standard, Yamate 17 standard, peer-reviewed literature, that says 18 that you have to print out the quantitative 19 EDS, EDXA graph -- graphics like in Figure 7, 20 have you, ma'am? 21 MR. LOCKE: Objection. 22 THE WITNESS: So in my report, 23 I cite the Newbury and Ritchie paper 24 which goes in excruciating detail of 25 how the appropriate -- of the</p>	<p>1 identification.) 2 QUESTIONS BY MR. FINCH: 3 Q. Professor Dyar, do you have an 4 article entitled "Tremolite Mesothelioma" by 5 Victor Roggli and other scientists at Duke 6 University published in the peer-reviewed 7 literature in 2002? 8 A. Yes, sir. 9 Q. All right. In... 10 A. I immediately note that the 11 authors of this paper are medical personnel 12 involved with pathology, and there is no 13 indication that any of them is a 14 mineralogist. 15 Q. And they are publishing in the 16 peer-reviewed literature about various types 17 of asbestos fibers found in human tissue, 18 correct? 19 A. Well, I'd have to have some 20 time to speed-read this paper, but the title 21 is called "Tremolite Mesothelioma," so I'd 22 have to assume that that's what the paper is 23 about. 24 Q. And in Figure 1 -- actually, on 25 page 448, in the second column the authors</p>
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<p>1 appropriate methodology for using EDS. 2 And they talk in that at length about 3 the different methods for making 4 calculations that determine 5 quantitative or semi-quantitative data 6 from an EDS spectrum. 7 So again, Newbury and Ritchie 8 is a good example of what is the 9 convention in this field, which is to 10 always acquire the EDS spectrum and 11 then print out the compositions that 12 are calculated by the instrument. 13 QUESTIONS BY MR. FINCH: 14 Q. Well, Dr. Gunther did not print 15 out the calculations in his 2010 paper, 16 correct? 17 MR. FROST: Objection. 18 THE WITNESS: He refers to the 19 SEM data, but he does not explicitly 20 include them, probably for reasons of 21 space. That printout would be pretty 22 tiny in a publication of this sort. 23 MR. FINCH: Can I have the 24 Roggli paper? 25 (Dyar Exhibit 12 marked for</p>	<p>1 write, "The elemental composition of 2 individual mineral fibers was detected by 3 means of energy-dispersive X-ray analysis, 4 EDXA." 5 Do you see that? 6 A. I'm looking. 7 Q. About halfway down, first 8 column -- I mean, the second column. 9 A. Yes. So that to me implies 10 that they output the compositions. 11 Q. In the paper they publish "the 12 energy-dispersive X-ray spectra for 13 tremolite, actinolite, anthophyllite and 14 chrysotile. Characteristic elemental 15 composition for each fiber type is shown. 16 The gold piece is due to sputter coating of 17 the sample to reduce charging artifacts." 18 Do you see that? 19 A. I see that. And it is my 20 opinion, based on being an associate editor 21 of the American Mineralogist for 20 years, 22 that no self-respecting mineralogical journal 23 would publish a figure like this. This is 24 insufficient for any kind of chemical 25 analysis.</p>

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<p style="text-align: right;">Page 146</p> <p>1 Q. So these doctors are doing 2 chemical analysis of the asbestos fibers they 3 found in human tissue, and they're printing 4 out the EDXA results in Figure 1. And they 5 do not include the quantitative data like you 6 show in Figure 7 in your report, correct? 7 MR. FROST: Objection. Form. 8 THE WITNESS: Well, I'd have to 9 look and make sure there isn't a 10 supplement to this particular article, 11 and I'd need a little more time to 12 inspect it. 13 For example, I'd like to know 14 how did they -- how did they identify 15 the samples as asbestos in the first 16 place. I don't see any other evidence 17 of any other kinds of analytical 18 techniques done in here. 19 I'd need to look at this much 20 more carefully, but it is certainly my 21 opinion that you couldn't use EDXA to 22 identify these -- distinguish between 23 these particular minerals. 24 So I -- these people may be 25 well-respected pathologists, but this</p>	<p style="text-align: right;">Page 148</p> <p>1 Q. Am I correct that on pages 526, 2 527, 528, and in 529, 530, which is Figures 3 1912 to 1919, all contain EDS spectra for 4 different minerals? 5 A. 526. Yes. They're simulated 6 patterns, yes. 7 Q. And am I correct that none of 8 these figures have the quantitative data like 9 Figure 7 in your report shown in the -- in 10 the pages of your textbook? 11 A. They don't include the 12 compositions because they are simulated 13 patterns, and simulated patterns are created 14 by inputting a composition. So there is no 15 need to output the composition because these 16 are simulated patterns that are created using 17 an input -- a specifically input composition. 18 MR. FINCH: Can I have the 19 other excerpt from that book? 20 (Dyar Exhibit 14 marked for 21 identification.) 22 QUESTIONS BY MR. FINCH: 23 Q. This is Exhibit 14, which is 24 another page of that book, page 182. 25 What does Figure 9.17 show?</p>
<p style="text-align: right;">Page 147</p> <p>1 particular figure and these 2 conclusions would never be published 3 in a journal that was peer-reviewed by 4 mineralogists. 5 QUESTIONS BY MR. FINCH: 6 Q. Are you familiar with a book 7 entitled "Mineralogy and Optical Mineralogy" 8 written by Melinda Darby Dyar and Mickey 9 Gunther? 10 A. Indeed I am. 11 While we are here, let me draw 12 your attention to page 607, where it gives 13 the revised amphibole nomenclature, which was 14 published in 1997 and 2004. So this is the 15 appropriate amphibole nomenclature to be 16 using. 17 MR. FINCH: Move to strike as 18 nonresponsive to any question pending. 19 (Dyar Exhibit 13 marked for 20 identification.) 21 QUESTIONS BY MR. FINCH: 22 Q. Do you recognize this as the 23 cover page, table of contents, preface and 24 Chapter 19 from your 2008 book? 25 A. Yes.</p>	<p style="text-align: right;">Page 149</p> <p>1 A. It shows the EDS output of an 2 Idaho star garnet from an SEM. 3 Q. Does it include the 4 quantitative data that is shown in Figure 7 5 in your report? 6 A. No, and it wouldn't have been 7 appropriate to include that. 8 First of all, the print would 9 be too small, and second of all, the point 10 here is to just show what an EDS spectrum 11 looks like. It's not our intent here in this 12 particular chapter to show -- or in this 13 particular figure to show anything 14 quantitative, so it wouldn't have been 15 appropriate to include the chemistry. 16 So in other words, we're not 17 trying to identify what mineral this is. We 18 already know that it's an Idaho star garnet, 19 so we don't need to output the chemistry to 20 show anything about its chemical composition. 21 In fact, it's highly likely 22 that we have an independent and much more 23 accurate chemical composition from electron 24 microprobe, and we just didn't feel it was 25 necessary or appropriate to include it here.</p>

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<p style="text-align: right;">Page 150</p> <p>1 Q. On page 531 of Exhibit 13?</p> <p>2 A. Uh-huh.</p> <p>3 Q. Here you're not looking at a</p> <p>4 simulated material, correct?</p> <p>5 You're looking at an</p> <p>6 approximately 5-micron-wide particle mounted</p> <p>7 on a fiber similar to the example shown in</p> <p>8 Figure 1920, images modified from Gunther's</p> <p>9 2007 paper, correct?</p> <p>10 A. Correct.</p> <p>11 Q. So then you are -- in the</p> <p>12 part C, higher magnification SEM image of the</p> <p>13 same particle with analysis points for the</p> <p>14 SEM beam indicated by 1 and 2. That's an EDS</p> <p>15 spectrum there, correct?</p> <p>16 A. Wait a minute. I'm not -- I'm</p> <p>17 not following you. Where are you?</p> <p>18 Q. Yeah. The bottom,</p> <p>19 Figure 19.21.</p> <p>20 A. Oh, sorry. I'm on the wrong</p> <p>21 page.</p> <p>22 Yep.</p> <p>23 Q. On this basis, the particle</p> <p>24 could be either a pyroxene or an amphibole;</p> <p>25 however, the refractive indices shows this</p>	<p style="text-align: right;">Page 152</p> <p>1 to characterize the chemical composition of a</p> <p>2 mineral, correct?</p> <p>3 A. Again, it would not be</p> <p>4 appropriate to include that in this</p> <p>5 particular context. This is a textbook, not</p> <p>6 a research -- not a research thing. And the</p> <p>7 point of this figure is to show how difficult</p> <p>8 it is to distinguish things purely from</p> <p>9 visual examination. In other words, he's</p> <p>10 saying you really need more information.</p> <p>11 And as I said in my report, the</p> <p>12 way to get more information would be to</p> <p>13 output the quantitative chemical data that</p> <p>14 the TEM and the SEM are easily able to</p> <p>15 provide.</p> <p>16 So this is not an appropriate</p> <p>17 place to include chemical data.</p> <p>18 MR. FINCH: Can I have the 2016</p> <p>19 Gunther paper and the IC 420 document?</p> <p>20 (Dyar Exhibit 15 marked for</p> <p>21 identification.)</p> <p>22 QUESTIONS BY MR. FINCH:</p> <p>23 Q. Here's Exhibit 15.</p> <p>24 Do you have Exhibit 15 in front</p> <p>25 of you, ma'am?</p>
<p style="text-align: right;">Page 151</p> <p>1 particle is an amphibole. Choosing a species</p> <p>2 name between tremolite and actinolite would</p> <p>3 be difficult.</p> <p>4 And the EDS of the grain there</p> <p>5 shows the chemical signature of an amphibole,</p> <p>6 correct?</p> <p>7 A. No, I think you're misreading</p> <p>8 that. It basically says on the basis of the</p> <p>9 EDS spectrum, it could be either a pyroxene</p> <p>10 or an amphibole.</p> <p>11 This is exactly the same point</p> <p>12 I make in the figure -- let's see -- in</p> <p>13 Figure 4 of my report where it says that on</p> <p>14 the basis of an EDS spectrum, these minerals</p> <p>15 are indistinguishable.</p> <p>16 So then he goes on to say that</p> <p>17 because of the refractive index data, in</p> <p>18 other words, the optimal microscopy, the PLM,</p> <p>19 it is possible to constrain the identify --</p> <p>20 the identity of this mineral to be an</p> <p>21 amphibole. But that's all you can tell.</p> <p>22 Q. But you don't print out the</p> <p>23 quantitative data like that shown in Figure 7</p> <p>24 of your report in this section of your</p> <p>25 textbook where you're using an EDS spectrum</p>	<p style="text-align: right;">Page 153</p> <p>1 A. I do.</p> <p>2 Q. This is -- one of the coauthors</p> <p>3 of this paper is your coauthor, Mickey</p> <p>4 Gunther?</p> <p>5 A. I see that.</p> <p>6 Q. Another is Dr. Roggli, whose</p> <p>7 paper we looked at a few minutes ago?</p> <p>8 A. Yes.</p> <p>9 Q. This is a case report of</p> <p>10 "Erionite-Associated Malignant Pleural</p> <p>11 Mesothelioma in Mexico," published in the</p> <p>12 peer-reviewed journal International Journal of</p> <p>13 Clinical and Experimental Pathology?</p> <p>14 A. I see that.</p> <p>15 Q. And you have two geologists</p> <p>16 publishing this paper along with Dr. Roggli,</p> <p>17 and the lead author's name I'm not going to</p> <p>18 try to pronounce because I'll butcher it.</p> <p>19 But there's about eight authors, and two of</p> <p>20 them are geologists, correct?</p> <p>21 A. I see that, yes.</p> <p>22 Q. And two of them are geologists</p> <p>23 that you have published with yourself,</p> <p>24 correct?</p> <p>25 A. Yes.</p>

<p style="text-align: right;">Page 154</p> <p>1 Q. And what they're doing is they 2 are analyzing fibers found in the tissue of a 3 human being to determine the nature of the 4 particles in their mesothelioma, correct? 5 MR. LOCKE: Objection. 6 THE WITNESS: I need a little 7 more time to look at this paper before 8 I could tell you exactly what they 9 were doing. 10 QUESTIONS BY MR. FINCH: 11 Q. Well, do you recognize Figure 3 12 and Figure 6 and Figure 4 as all containing 13 EDXA or EDS spectrum of materials that 14 they're analyzing? 15 A. I see that those figures do 16 contain EDS spectra, yes. 17 Q. All right. So in Figure 3 on 18 page 5727 -- and this is a scientific paper 19 where they're reporting on finding erionite 20 fibers in someone's mesothelioma. 21 That's at least the title of 22 the paper, correct? 23 MR. LOCKE: Objection. 24 THE WITNESS: The title of the 25 paper is "Erionite-Associated</p>	<p style="text-align: right;">Page 156</p> <p>1 quantitative data that you say is required 2 for a scientific analysis like that shown in 3 Figure 7 in your report, correct? 4 A. In fact, in my report there are 5 no independent constraints on where the 6 particles are coming from. 7 In this report, it appears to 8 me that the particles are coming from a 9 repairman who was raised on a farm in the 10 Mexico volcanic belt, presumably near a 11 source of erionite. So I'd have to spend 12 more time with this paper. 13 But it appears to me that they 14 already knew that this was erionite, and they 15 were simply confirming that the EDS spectra 16 were consistent with that. And in that case, 17 it's not necessary to print out the chemical 18 composition. 19 In the case of the particles 20 being studied by Drs. Longo and Rigler, we 21 have no such knowledge. We have no idea and 22 no independent constraints on what mineral it 23 could be or what the composition could be. 24 And, therefore, it is their obligation to 25 produce as much quantitative information as</p>
<p style="text-align: right;">Page 155</p> <p>1 Malignant Pleural Mesothelioma in 2 Mexico." That's the title. 3 QUESTIONS BY MR. FINCH: 4 Q. All right. Figure 3, part B, 5 is the data that they choose to report in 6 this peer-reviewed paper, "Energy-Dispersive 7 Spectrum from an Erionite Fiber Showing Peaks 8 for Aluminum and Silicone." 9 "There's a suggestion of 10 smaller peaks for sodium and iron. Platinum 11 peaks are from sputter contained in the 12 sample for imaging purposes." 13 Do you see that? 14 A. I see that it says that, yes. 15 Q. All right. And so what that is 16 is an EDS or EDXA spectrum of a reference 17 sample of erionite, correct? 18 A. I don't see where it says that. 19 Q. Well, would you agree with me 20 that the authors call it an EDS spectrum from 21 an erionite fiber? That's what they call it 22 in the paper? 23 A. That's what it says right here 24 in the caption to Figure 3. 25 Q. And they don't print out the</p>	<p style="text-align: right;">Page 157</p> <p>1 possible. 2 So again, I would need some 3 further study to address specific questions 4 about this paper, but my understanding is 5 that they're simply showing that the SEM 6 images and the EDS analyses are consistent 7 with their existing supposition that this is 8 erionite. 9 Q. And their existing supposition 10 that this is erionite is based on testing 11 that people have done of the soil in Mexico 12 where they found erionite fibers, right? 13 A. I don't -- 14 MR. FROST: Objection. Form. 15 THE WITNESS: I don't know that 16 for a fact. I'd have to take much 17 more time to review this paper. 18 QUESTIONS BY MR. FINCH: 19 Q. All right. So Figure 6 has a 20 EDX spectra of Mexican soil with erionite, 21 correct? 22 A. That's what it says here. 23 Q. And again, there's no 24 quantitative data printed out in Figure 6 C, 25 correct?</p>

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<p>1 A. Again --</p> <p>2 Q. Of the type -- of the type that</p> <p>3 is shown in Exhibit 7 {sic} in your report,</p> <p>4 Figure 7 in your report?</p> <p>5 A. There are no chemical analyses</p> <p>6 printed out here because it would not be</p> <p>7 appropriate. They already know it's erionite</p> <p>8 based on, it looks like, independent studies.</p> <p>9 Q. Okay. They already know it's</p> <p>10 erionite based on independent studies.</p> <p>11 How do you know that Dr. Longo</p> <p>12 and Dr. Rigler don't already know that there</p> <p>13 is tremolite and anthophyllite asbestos in</p> <p>14 the Vermont talc based on independent studies</p> <p>15 that other analysts have done?</p> <p>16 MR. FROST: Objection to form.</p> <p>17 MR. LOCKE: Objection.</p> <p>18 MR. CHACHKES: Objection.</p> <p>19 THE WITNESS: There is no</p> <p>20 evidence in Drs. Longo and Rigler's</p> <p>21 reports, plural, that they have any</p> <p>22 data that confirm that any of the</p> <p>23 particles they studied are asbestos.</p> <p>24 Perhaps that's a good place to</p> <p>25 break for lunch.</p>	<p>1 do you?</p> <p>2 MR. CHACHKES: Objection.</p> <p>3 MR. FROST: Objection.</p> <p>4 THE WITNESS: As I said at the</p> <p>5 outset of this question period, I</p> <p>6 looked at all the references cited by</p> <p>7 Drs. Longo and Rigler and read the</p> <p>8 ones that were available to me. So I</p> <p>9 do not recall them alluding to any</p> <p>10 such testing reports.</p> <p>11 QUESTIONS BY MR. FINCH:</p> <p>12 Q. And if they had, they have that</p> <p>13 as a source of their basis for knowledge, you</p> <p>14 don't know about it, right?</p> <p>15 MR. CHACHKES: Objection.</p> <p>16 THE WITNESS: I can't read the</p> <p>17 minds of Drs. Longo and Rigler, no.</p> <p>18 QUESTIONS BY MR. FINCH:</p> <p>19 Q. You can read the trial</p> <p>20 testimony and the discussion of the Johnson &</p> <p>21 Johnson tests and documents of Dr. Longo in</p> <p>22 multiple ovarian cancer and asbestos cases,</p> <p>23 and you haven't done that, correct?</p> <p>24 MR. CHACHKES: Objection.</p> <p>25 MR. FROST: Objection.</p>
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<p>1 MR. CHACHKES: It is lunchtime.</p> <p>2 It's kind of 12 what? 12:40?</p> <p>3 MR. FINCH: Let me have two</p> <p>4 follow-up questions based on that.</p> <p>5 QUESTIONS BY MR. FINCH:</p> <p>6 Q. You haven't reviewed anybody's</p> <p>7 testing of talc from the Windsor mines in</p> <p>8 Vermont, have you, ma'am?</p> <p>9 MR. FROST: Objection.</p> <p>10 MR. CHACHKES: Objection.</p> <p>11 QUESTIONS BY MR. FINCH:</p> <p>12 Q. Other than Longo and Rigler?</p> <p>13 A. I was asked --</p> <p>14 MR. CHACHKES: Objection.</p> <p>15 THE WITNESS: -- to review the</p> <p>16 methodology of Drs. Longo and Rigler,</p> <p>17 and that's what I did.</p> <p>18 QUESTIONS BY MR. FINCH:</p> <p>19 Q. You don't know what Johnson &</p> <p>20 Johnson documents they have reviewed, they'd</p> <p>21 given the same kind of information about the</p> <p>22 potential for tremolite asbestos and</p> <p>23 anthophyllite asbestos to be in those mines</p> <p>24 that the authors of the 2016 paper that's</p> <p>25 Exhibit 15 have about the erionite in Mexico,</p>	<p>1 THE WITNESS: I have not done</p> <p>2 that because it would not be relevant</p> <p>3 to my task, which was to evaluate</p> <p>4 their methodology.</p> <p>5 MR. FINCH: All right. This is</p> <p>6 a good time to break for lunch.</p> <p>7 VIDEOGRAPHER: Okay. Please</p> <p>8 remove your microphones. The time is</p> <p>9 12:37 p.m. Off the record.</p> <p>10 (Off the record at 12:37 p.m.)</p> <p>11 VIDEOGRAPHER: Okay. We are</p> <p>12 back on the record. The time is</p> <p>13 1:22 p.m.</p> <p>14 QUESTIONS BY MR. FINCH:</p> <p>15 Q. Good afternoon, Ms. Darby Dyar.</p> <p>16 We are back on the record after a lunch</p> <p>17 break.</p> <p>18 Did you review any documents</p> <p>19 over the lunch break?</p> <p>20 A. No.</p> <p>21 Q. You were talking about, in</p> <p>22 connection with the erionite paper that I</p> <p>23 just showed you, the scientists who wrote</p> <p>24 that paper had information that erionite was</p> <p>25 a possible mineral in the soil in Mexico,</p>

<p style="text-align: right;">Page 162</p> <p>1 correct?</p> <p>2 Do you recall that discussion?</p> <p>3 A. Let me pull the paper out and</p> <p>4 take a look at it.</p> <p>5 So, yes, what I said was it</p> <p>6 appears that this is a report based on</p> <p>7 results from a vehicle repairman who was</p> <p>8 raised on a farm in the Mexican volcanic belt</p> <p>9 region.</p> <p>10 Q. And what information did the</p> <p>11 scientists have that led them to suspect that</p> <p>12 erionite might be in that region of the</p> <p>13 world?</p> <p>14 MR. FROST: Objection.</p> <p>15 THE WITNESS: You know, this</p> <p>16 paper is seven pages long. I'd happy</p> <p>17 to take the time to read it. But I</p> <p>18 would need time, to answer that</p> <p>19 question, to read this paper.</p> <p>20 QUESTIONS BY MR. FINCH:</p> <p>21 Q. You said before you read the</p> <p>22 paper that the -- Dr. Gunther and the other</p> <p>23 scientists who wrote it had some information</p> <p>24 that erionite was a possible contaminant in</p> <p>25 the soil in Mexico.</p>	<p style="text-align: right;">Page 164</p> <p>1 have a wide variety of mineral</p> <p>2 assemblages, but I don't know anything</p> <p>3 about mines specifically.</p> <p>4 QUESTIONS BY MR. FINCH:</p> <p>5 Q. Okay. Rocks that contain talc</p> <p>6 can have differing amounts of accessory</p> <p>7 minerals in the ore that the talc is mined</p> <p>8 from, correct?</p> <p>9 MR. CHACHKES: Objection.</p> <p>10 MR. FROST: Objection.</p> <p>11 THE WITNESS: Again, I only</p> <p>12 know in general terms where -- how</p> <p>13 talc is formed geologically. I know</p> <p>14 nothing about talc mines, so I can't</p> <p>15 answer any questions relating to talc</p> <p>16 occurrences in mines.</p> <p>17 QUESTIONS BY MR. FINCH:</p> <p>18 Q. Well, would you expect that the</p> <p>19 owners of the Johnson & Johnson mines in</p> <p>20 Vermont would have documented their</p> <p>21 understanding as to what material they were</p> <p>22 mining out of the ground over the course of</p> <p>23 the 35 years that the mines were operating?</p> <p>24 MR. FROST: Objection.</p> <p>25 THE WITNESS: As I said, I</p>
<p style="text-align: right;">Page 163</p> <p>1 And I'm just wondering how you</p> <p>2 came to that conclusion when I just showed</p> <p>3 you the paper before lunch.</p> <p>4 MR. CHACHKES: Objection.</p> <p>5 THE WITNESS: Well, I looked at</p> <p>6 that line that I just read, that the</p> <p>7 person had epithelial malignant</p> <p>8 pleural mesothelioma in a vehicle</p> <p>9 repairman. So -- and it says who was</p> <p>10 raised on a farm in the Mexican</p> <p>11 volcanic belt region. So I -- that's</p> <p>12 where I'm getting that conclusion.</p> <p>13 But as I said before, I'd have</p> <p>14 to read the paper to have -- to have</p> <p>15 any ability to answer your question in</p> <p>16 an accurate way.</p> <p>17 QUESTIONS BY MR. FINCH:</p> <p>18 Q. Okay. Would you agree that</p> <p>19 talc mines can have differing amounts of</p> <p>20 accessory minerals in the ore, in the talc</p> <p>21 ore, in the mine?</p> <p>22 MR. CHACHKES: Objection.</p> <p>23 THE WITNESS: I honestly don't</p> <p>24 know anything about talc mines. I do</p> <p>25 know that rocks that contain talc can</p>	<p style="text-align: right;">Page 165</p> <p>1 don't know anything about mine</p> <p>2 protocols or documentation. I have no</p> <p>3 knowledge of that, and I'd have to</p> <p>4 read up on it and research it to give</p> <p>5 you a good answer.</p> <p>6 QUESTIONS BY MR. FINCH:</p> <p>7 Q. Okay. You said you reviewed</p> <p>8 some of Dr. Longo's state court reports, in</p> <p>9 addition to his three reports in the MDL,</p> <p>10 correct?</p> <p>11 A. Yes. I skimmed them to look</p> <p>12 for more analytical data, and having found</p> <p>13 none, I didn't consider them further.</p> <p>14 Q. Okay. Did you see that in</p> <p>15 those reports, or in the disclosures that</p> <p>16 went with those reports, he had listed</p> <p>17 certain documents with Johnson & Johnson or</p> <p>18 Imerys Bates numbers on them that formed part</p> <p>19 of the basis of his knowledge in the state</p> <p>20 court cases?</p> <p>21 A. No, because as I just said, I</p> <p>22 only skimmed those documents to look for data</p> <p>23 that were relevant to my investigation, which</p> <p>24 was to evaluate the methodology used by them</p> <p>25 in the Longo and Rigler reports cited in my</p>

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<p>1 report.</p> <p>2 Q. Okay. So to the extent that</p> <p>3 Dr. Longo, in various state court reports or</p> <p>4 in disclosures that you've been provided</p> <p>5 with, lists out Bates labels of Johnson &</p> <p>6 Johnson documents or Imerys documents, you</p> <p>7 didn't bother to review those; is that</p> <p>8 correct?</p> <p>9 MR. FROST: Objection.</p> <p>10 THE WITNESS: As I said, those</p> <p>11 documents were reviewed by me only</p> <p>12 with the goal of looking for further</p> <p>13 analytical data.</p> <p>14 But my goal in this undertaking</p> <p>15 is to evaluate methodology, and so I</p> <p>16 did not deem that that was relevant</p> <p>17 and, therefore, did not pursue the</p> <p>18 additional references in those</p> <p>19 reports.</p> <p>20 QUESTIONS BY MR. FINCH:</p> <p>21 Q. Is it your opinion that the</p> <p>22 entire universe of minerals that exists on</p> <p>23 the planet Earth can be found in the Vermont</p> <p>24 talc mines from which Johnson & Johnson</p> <p>25 obtained ore for baby powder?</p>	<p>1 scientist who was retained to analyze</p> <p>2 materials that come from a specific mine in a</p> <p>3 specific part of the world, one reasonable</p> <p>4 thing to do would be to read information</p> <p>5 about that geographic mine or that geographic</p> <p>6 source of the materials so that they have</p> <p>7 some understanding of what other researchers</p> <p>8 have found when they have investigated that</p> <p>9 particular mine?</p> <p>10 MR. CHACHKES: Objection.</p> <p>11 THE WITNESS: That's a really</p> <p>12 nebulous, hypothetical question. I</p> <p>13 was not hired to do that; I was hired</p> <p>14 to review methodology. So I don't</p> <p>15 have an opinion on that question</p> <p>16 because I haven't even thought about</p> <p>17 it.</p> <p>18 QUESTIONS BY MR. FINCH:</p> <p>19 Q. Have you ever been -- you have</p> <p>20 been hired, have you not, to analyze rocks</p> <p>21 and minerals found in outer space, on Mars or</p> <p>22 the moon, for example, to try to determine</p> <p>23 what they are, right?</p> <p>24 A. I am funded by both NASA and</p> <p>25 the National Science Foundation to study</p>
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<p>1 MR. LOCKE: Objection.</p> <p>2 THE WITNESS: I have no</p> <p>3 knowledge of anything having to do</p> <p>4 with the geology of -- of the Vermont</p> <p>5 talc mines. So I would presume that</p> <p>6 because they are rocks, they contain</p> <p>7 minerals, but I know nothing about</p> <p>8 either the geology or the mineralogy</p> <p>9 of the Vermont talc mines.</p> <p>10 QUESTIONS BY MR. FINCH:</p> <p>11 Q. Your textbook was -- with</p> <p>12 Dr. Gunther was written for students, is that</p> <p>13 correct, graduate-level students?</p> <p>14 A. Actually it was written for</p> <p>15 undergraduate-level students, but we've sold</p> <p>16 a lot of copies of the book to people that</p> <p>17 don't do either of those things. We presume;</p> <p>18 we don't really know.</p> <p>19 Q. And the purpose of the book was</p> <p>20 in part to teach them how to analyze minerals</p> <p>21 to determine what they are?</p> <p>22 A. Yes, that's part of a standard</p> <p>23 mineralogy curriculum.</p> <p>24 Q. Would you agree with me that if</p> <p>25 you are a geologist who was -- or any</p>	<p>1 mineralogy of objects from all over the solar</p> <p>2 system, yes.</p> <p>3 Q. And as part of your background</p> <p>4 work in -- let's say you're given a grant to</p> <p>5 study minerals found on the moon.</p> <p>6 As part of your work, isn't it</p> <p>7 correct that you go and review the literature</p> <p>8 that exists about what other scientists have</p> <p>9 found in that environment that gives you some</p> <p>10 background understanding of what you might be</p> <p>11 looking for?</p> <p>12 MR. FROST: Objection.</p> <p>13 THE WITNESS: It depends on</p> <p>14 what I was -- what I was engaged to do</p> <p>15 or what I proposed to do. If I</p> <p>16 proposed to do a certain kind of</p> <p>17 analysis, yes, I would want to know</p> <p>18 who else had done analyses on that</p> <p>19 same material.</p> <p>20 But in this particular case</p> <p>21 here, I wasn't hired to do any</p> <p>22 testing, so I have no opinion on -- no</p> <p>23 interest in knowing what the rest of</p> <p>24 the literature says because I'm only</p> <p>25 evaluating methodology.</p>

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<p>1 QUESTIONS BY MR. FINCH:</p> <p>2 Q. Dr. Longo was hired to test</p> <p>3 specific products and specific ores where the</p> <p>4 source of that material was ultimately talc</p> <p>5 mines in Vermont, Italy or China, correct?</p> <p>6 MR. CHACHKES: Objection.</p> <p>7 THE WITNESS: All I know is</p> <p>8 that the materials that are in this --</p> <p>9 that I reviewed in preparation of this</p> <p>10 report came from Asia, Vermont, and I</p> <p>11 don't remember where else.</p> <p>12 QUESTIONS BY MR. FINCH:</p> <p>13 Q. Italy?</p> <p>14 A. Italy.</p> <p>15 Q. And would you agree with me</p> <p>16 that it would be a reasonable thing for a</p> <p>17 scientist to do, who had been tasked with the</p> <p>18 job of analyzing the minerals in a product</p> <p>19 where the source of the primary ingredient of</p> <p>20 the product was a mine in a particular part</p> <p>21 of the world, to read studies that the people</p> <p>22 who owned the mine had done on the nature of</p> <p>23 the minerals that they were taking out of the</p> <p>24 ground?</p> <p>25 MR. LOCKE: Objection.</p>	<p>1 that.</p> <p>2 What you want to know is what's</p> <p>3 in the material based on the</p> <p>4 analytical methods that you're using,</p> <p>5 and that has nothing to do with where</p> <p>6 the material came.</p> <p>7 In fact, knowing where the</p> <p>8 material came from might bias a</p> <p>9 judgment, whereas unbiased judgment,</p> <p>10 which is what we want in science,</p> <p>11 would probably be most useful.</p> <p>12 (Dyar Exhibits 16 and 17 marked</p> <p>13 for identification.)</p> <p>14 QUESTIONS BY MR. FINCH:</p> <p>15 Q. Let's mark this as Exhibit 16</p> <p>16 and 17.</p> <p>17 Okay. I'm putting Exhibit 16</p> <p>18 and 17 in front of you and ask if you've ever</p> <p>19 seen them before.</p> <p>20 A. No, Exhibit 16, and no on</p> <p>21 Exhibit 17.</p> <p>22 Q. All right. Turn to page 2 of</p> <p>23 Exhibit 16.</p> <p>24 Did you have the understanding</p> <p>25 that in 1989 Johnson & Johnson sold the mines</p>
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<p>1 THE WITNESS: No, I explicitly</p> <p>2 do not agree.</p> <p>3 The only thing that's relevant</p> <p>4 is the methodology and the data that</p> <p>5 were produced in the reports and</p> <p>6 whether or not the methodology is</p> <p>7 good, which it, of course, is not.</p> <p>8 So where the minerals came from</p> <p>9 is of no concern to whether -- to what</p> <p>10 the methods were that were used to</p> <p>11 analyze it. Those two things have</p> <p>12 nothing to do with each other.</p> <p>13 QUESTIONS BY MR. FINCH:</p> <p>14 Q. Would you agree with me that if</p> <p>15 you're doing a bulk analysis of a sample to</p> <p>16 determine whether or not it has asbestos in</p> <p>17 it or not, information about the manufacturer</p> <p>18 of that sample would be important information</p> <p>19 for Dr. Longo or any scientist to know before</p> <p>20 testing the material to determine whether and</p> <p>21 to what extent it had asbestos in it?</p> <p>22 MR. FROST: Objection.</p> <p>23 THE WITNESS: No, I do not</p> <p>24 agree. And in fact, I can't even</p> <p>25 understand why you would want to know</p>	<p>1 that it -- in Vermont that it got its talc</p> <p>2 from to a company called Cyprus?</p> <p>3 MR. FROST: Objection.</p> <p>4 THE WITNESS: I have no</p> <p>5 knowledge of that.</p> <p>6 QUESTIONS BY MR. FINCH:</p> <p>7 Q. And then ultimately, through a</p> <p>8 series of other transactions, ended up -- the</p> <p>9 mines are owned by Imerys?</p> <p>10 A. I have no knowledge of that.</p> <p>11 Q. On page 2 of Exhibit 16, the</p> <p>12 Cyprus employees who are writing this</p> <p>13 document write that "the other serious</p> <p>14 mineralogical contaminant in the talc ores of</p> <p>15 Vermont is the fibrous variety of the</p> <p>16 amphibole minerals, tremolite and actinolite,</p> <p>17 hydrous calcium, iron magnesium silicates,</p> <p>18 which have been classified as asbestiform</p> <p>19 minerals by OSHA and EPA. OSHA was suspected</p> <p>20 to declassify nonfibrous, blocky tremolite on</p> <p>21 February 29th but not -- has not as yet</p> <p>22 announced their decision. As a result, all</p> <p>23 tremolite, the fibrous varieties of all</p> <p>24 amphiboles and chrysotile asbestos in talc</p> <p>25 ores, are a source of great concern to all</p>

Melinda Darby Dyar, Ph.D.

<p style="text-align: right;">Page 174</p> <p>1 talc producers and especially to the 2 marketers of cosmetic products. Cyprus 3 claims that there are no fibers in their 4 cosmetic talc products, and they work 5 rigorously to ensure this. However, a recent 6 paper published by Rutgers University worker 7 Alice Blount suggests the presence of fiber 8 in several cosmetic talcs, some of which 9 might have been from Cyprus West Windsor, 10 which is a source of great concern to Cyprus 11 management and potentially to their principal 12 customer, Johnson & Johnson. Talc de Luzenac 13 personnel are well aware of the situation, 14 and Phillipe Moreau is currently quietly 15 working to identify the reality and the 16 magnitude of the problem. 17 "Vermont talcs are derived from 18 altered serpentinite, a natural host for 19 asbestiform minerals. There is certainly 20 visible tremolite and actinolite in specific 21 zones of Vermont deposits. Fibrous tremolite 22 was identified by the writer in exposures and 23 cores at the East Argonaut and Black Bear 24 mine. Cyprus staff report tremolite from the 25 Hammondsville and Clifton deposits."</p>	<p style="text-align: right;">Page 176</p> <p>1 information in this document for me to 2 be able to say anything. 3 QUESTIONS BY MR. FINCH: 4 Q. Okay. So you certainly can't 5 opine that this information contained in 6 Exhibit 16 is incorrect, can you, ma'am? 7 MR. FROST: Objection. 8 MR. CHACHKES: Objection. 9 THE WITNESS: Indeed, I can't 10 opine if it's correct either. I have 11 no opinion. 12 QUESTIONS BY MR. FINCH: 13 Q. Okay. 14 A. Because there is insufficient 15 context and information about this document. 16 For example, it says tremolite, 17 but there's no indication of really what kind 18 of tremolite it is. It confuses the 19 definition of fibers. 20 I would say there are a lot of 21 issues with this document that I would want 22 to know more about, so I can't really comment 23 about this document. 24 Q. Okay. Exhibit 17, do you have 25 that document?</p>
<p style="text-align: right;">Page 175</p> <p>1 MR. CHACHKES: Past. You 2 missed -- 3 MR. FINCH: Past tremolite from 4 the Hammondsville and Clifton 5 deposits. 6 QUESTIONS BY MR. FINCH: 7 Q. Do you see that? 8 A. I see that that's what the 9 document says, yes. 10 Q. Okay. And you have no 11 knowledge one way or another to suggest that 12 the authors of this memorandum are wrong in 13 their conclusions, correct? 14 MR. CHACHKES: Objection. 15 MR. LOCKE: Objection. 16 THE WITNESS: I do not have 17 enough information about this document 18 to render an opinion. 19 I see that it's an interoffice 20 correspondence. It talks about mines 21 in Vermont, but Vermont's a big state. 22 These deposits are presumably aerially 23 very large. I don't know if these 24 deposits were used for talc. 25 So there's just not enough</p>	<p style="text-align: right;">Page 177</p> <p>1 A. I do. 2 Q. This is analysis of fibrous 3 material from Argonaut waste rock? 4 A. Yes, I see that. 5 Q. Dated May 23, 2002? 6 A. Yes. That's what it says. 7 Q. Do you know who Julie Pier is? 8 A. No. 9 Q. You don't know that she's a 10 scientist for Luzenac America at the time 11 this memorandum was written? 12 MR. FROST: Objection. 13 THE WITNESS: I've never heard 14 of either Julie Pier or Luzenac. 15 QUESTIONS BY MR. FINCH: 16 Q. All right. On the second page 17 there is an SEM image and an EDS chemical 18 analysis of waste rock from the Argonaut 19 mine. 20 Do you see that? 21 A. Yes. 22 Q. All right. Do you agree with 23 me that the pictograph at the top, the 24 material looks like fibrous material and not 25 fragments?</p>

45 (Pages 174 to 177)

<p style="text-align: right;">Page 178</p> <p>1 A. It's almost impossible to judge 2 that from a two-dimensional image, so I don't 3 really have any opinion on that. I don't 4 have an opinion. 5 I'd like to be able to measure 6 the population and do an analysis on it that 7 way to render an opinion. 8 Q. Would you agree with me that 9 a scientist using a scanning electron 10 microscope can, by moving the plates around, 11 look at the structure that he or she is 12 viewing in three dimensions and make a 13 determination whether morphologically and 14 visually it looks more like a fiber or a 15 bundle of fibers or a cleavage fragment? 16 MR. FROST: Objection. 17 THE WITNESS: No, I do not 18 agree with that statement. In fact, 19 the amount of tilt on the stage is 20 very small. There's no way you can 21 get a three-dimensional view of 22 something. 23 Only with a special kind of 24 polarizing light microscope can you 25 actually do a three-dimensional</p>	<p style="text-align: right;">Page 180</p> <p>1 Q. This is science being done for 2 commercial purposes, correct? 3 MR. FROST: Objection. 4 THE WITNESS: As I've stated, I 5 have no idea what Luzenac is. 6 QUESTIONS BY MR. FINCH: 7 Q. This was science being done not 8 for courtroom purposes? 9 A. I have no idea what the purpose 10 of this document is. I don't know anything 11 about the context. And it appears that there 12 is additional information that is not 13 included in the two pages that I've been 14 given, so it's hard to comment on this. I 15 can't even tell if this is the entire memo. 16 Q. Can you opine one way or 17 another about whether tremolite exists in 18 Vermont talc mines? 19 MR. CHACHKES: Objection. 20 THE WITNESS: No, I cannot. I 21 saw no evidence in any of the 22 Dr. Longo and Rigler reports that I 23 examined that supported a conclusion 24 of asbestos being present, and that's 25 the only data that I'm familiar with.</p>
<p style="text-align: right;">Page 179</p> <p>1 assessment in that manner. 2 QUESTIONS BY MR. FINCH: 3 Q. Do you see also that there's an 4 EDS chemical analysis below it? 5 A. I do. 6 Q. And the -- Dr. Pier concludes, 7 based on that, that the chemical analysis of 8 the material is consistent with tremolite? 9 MR. CHACHKES: Objection. 10 THE WITNESS: I see that that's 11 what this document concludes, yes. 12 QUESTIONS BY MR. FINCH: 13 Q. And the SEM, EDS analysis on 14 the second page of Exhibit 17 contains a 15 conclusion that the chemical composition of 16 the material is consistent with tremolite, 17 correct? 18 A. It says, "The chemical analysis 19 of the material above is consistent with 20 tremolite." Yes, that's what it says. 21 Q. And it doesn't have any of the 22 quantitative data found at the bottom of 23 Figure 7 in your report, correct? 24 A. That's correct. It looks to me 25 like another example of bad science.</p>	<p style="text-align: right;">Page 181</p> <p>1 Those are the only data I'm familiar 2 with. 3 QUESTIONS BY MR. FINCH: 4 Q. Can anthophyllite have varying 5 amounts of iron? 6 A. Yes. 7 Q. We haven't talked about another 8 way to analyze the chemical composition of 9 materials, X-ray diffraction or XRD. 10 Are you familiar with that? 11 A. Certainly. There's a chapter 12 if my book, and I teach that routinely. 13 Q. Would you agree with me that 14 what X-ray diffraction does, it allows you 15 to -- well, you tell me what X-ray 16 diffraction does, XRD. 17 A. X-ray diffraction is a superset 18 of what we've been talking about, SAED. It 19 uses diffraction of atoms in layers in a 20 mineral structure to indicate diagnostic 21 properties such as the spacing between the 22 atoms in the structure. 23 Q. Is X-ray diffraction a 24 sensitive-enough tool to find asbestos 25 contamination in material if it's less than</p>

<p style="text-align: right;">Page 182</p> <p>1 0.1 percent by weight of the material?</p> <p>2 MR. FROST: Objection.</p> <p>3 THE WITNESS: So I believe if</p> <p>4 you look at the ISO 22262-1, it</p> <p>5 explains that in fact it is difficult</p> <p>6 to measure abundances of small</p> <p>7 materials at those levels with X-ray</p> <p>8 diffraction.</p> <p>9 QUESTIONS BY MR. FINCH:</p> <p>10 Q. Would X-ray diffraction allow</p> <p>11 you to determine whether or not there is</p> <p>12 fibrous talc in a sample of talc that you</p> <p>13 were testing?</p> <p>14 A. Absolutely not.</p> <p>15 MR. LOCKE: Objection.</p> <p>16 THE WITNESS: Because X-ray</p> <p>17 diffraction uses the arrangement of</p> <p>18 atoms in the crystal structure, which</p> <p>19 at best only tells you which mineral</p> <p>20 species it is. But X-ray diffraction</p> <p>21 cannot determine anything about the</p> <p>22 morphology of particular particles.</p> <p>23 QUESTIONS BY MR. FINCH:</p> <p>24 Q. Would you agree that talc can</p> <p>25 be fibrous?</p>	<p style="text-align: right;">Page 184</p> <p>1 Q. And aspect ratio just is the</p> <p>2 ratio of length to width; is that correct?</p> <p>3 A. That's correct.</p> <p>4 But it's possible to have</p> <p>5 morphologies that have nothing to do with</p> <p>6 dimensions.</p> <p>7 Q. How so?</p> <p>8 A. For example, minerals form</p> <p>9 as -- in rose shapes with petals, so that's a</p> <p>10 specific morphology.</p> <p>11 Q. Would you agree with me that</p> <p>12 minerals can form in bundles?</p> <p>13 A. Bundles is not a term we</p> <p>14 generally use to identify minerals. For</p> <p>15 example, I don't believe we even discuss the</p> <p>16 term "bundle" in the chapter of our book</p> <p>17 where we talk about the physical</p> <p>18 characteristics of minerals.</p> <p>19 On the other hand, in my report</p> <p>20 I show a photograph of a -- of a -- excuse</p> <p>21 me, of a bundle, so indeed I'm aware that</p> <p>22 some minerals can form as bundles.</p> <p>23 Q. Do you agree with me that</p> <p>24 asbestos fibers can form as bundles?</p> <p>25 A. Well, given that there's a</p>
<p style="text-align: right;">Page 183</p> <p>1 A. I have no knowledge of that</p> <p>2 because I haven't studied that.</p> <p>3 Q. But whether talc is -- can be</p> <p>4 fibrous or not, you wouldn't -- X-ray</p> <p>5 diffraction would not be able to tell you</p> <p>6 whether there was fibrous talc in a sample of</p> <p>7 talc, correct?</p> <p>8 A. Correct. X-ray diffraction</p> <p>9 cannot determine the morphology of a</p> <p>10 particle. Only confirm the crystal</p> <p>11 structure.</p> <p>12 Q. You just used the word</p> <p>13 "morphology" in a sentence.</p> <p>14 Can you define how you used</p> <p>15 morphology in that sentence?</p> <p>16 A. I meant the shape, aspect</p> <p>17 ratio. It's a...</p> <p>18 Q. So morphology can mean shape</p> <p>19 and aspect ratio?</p> <p>20 A. Well, I was saying as -- for</p> <p>21 example, as evidenced by aspect ratio, is</p> <p>22 what I meant to say.</p> <p>23 Q. Okay. As evidenced by aspect</p> <p>24 ratio?</p> <p>25 A. Correct.</p>	<p style="text-align: right;">Page 185</p> <p>1 picture of a -- here we go. It's</p> <p>2 Figure 23 B. It's an image of a tremolite</p> <p>3 bundle of asbestiform particles from a paper</p> <p>4 by Harper, et al.</p> <p>5 So, yes, given that this image</p> <p>6 exists, and to the extent that Harper asserts</p> <p>7 that they can form as bundles, then, yes,</p> <p>8 indeed, tremolite can form as an asbestiform</p> <p>9 bundle.</p> <p>10 Q. And can anthophyllite form as</p> <p>11 an asbestiform bundle?</p> <p>12 A. I have personally not seen</p> <p>13 either an image or a -- with my own eyes, an</p> <p>14 anthophyllite bundle, so I really can't</p> <p>15 answer that question either way.</p> <p>16 Q. So morphology refers to the</p> <p>17 shape as measured by aspect ratio and --</p> <p>18 A. As measured, for example, by --</p> <p>19 Q. As measured, for example, by</p> <p>20 the aspect ratio and the nature in which the</p> <p>21 material can be found, whether it's</p> <p>22 rose-petal-shaped or a bundle or a fragment</p> <p>23 or something else, right?</p> <p>24 A. Correct.</p> <p>25 Q. And those are -- the way you</p>

<p style="text-align: right;">Page 186</p> <p>1 would analyze that in a laboratory is you 2 would take a photomicrograph of it using 3 either a PLM or a electron microscope, 4 scanning or transmission, and take 5 measurements of the structure that you're 6 observing to determine what its aspect ratio 7 is, how thick it is, how long it is, and what 8 it looks like visually, like exhibit -- 9 excuse me, Figure 23 C that you referred me 10 to before. 11 MR. CHACHKES: Objection. 12 QUESTIONS BY MR. FINCH: 13 Q. Correct? 14 A. I referred you to 23 B before. 15 Q. Excuse me, 23 B as in boy. 16 A. So I got to look at your 17 question. 18 It -- actually, can you restate 19 the question as a question? 20 Q. Sure. 21 Morphology, I'm trying to get 22 the universe of the stuff that goes into the 23 analysis of morphology. 24 It is the shape as, for 25 example, measured by aspect ratio, the size,</p>	<p style="text-align: right;">Page 188</p> <p>1 image or individual crystal. 2 Q. Okay. So if you have an 3 individual image that is 10 microns long, you 4 can't make a conclusive diagnosis or 5 determination as to whether or not based on 6 morphology it is asbestiform or 7 non-asbestiform, correct? 8 MR. FROST: Objection. 9 THE WITNESS: You cannot 10 determine anything from an individual 11 image. You need a population to be 12 able to make a determination. 13 QUESTIONS BY MR. FINCH: 14 Q. Okay. And how many fibers 15 consist of a population or images, 16 structures? 17 A. Statistically, that's a 18 difficult answer -- that's a difficult 19 question to answer. It would depend on the 20 context and the problem at hand. 21 Q. Is there any generally accepted 22 standard that you could point me to that says 23 in order to do a statistical analysis of a 24 population you need a minimum of X structures 25 or fibers to analyze?</p>
<p style="text-align: right;">Page 187</p> <p>1 the appearance, and the form in which it is 2 found, as exemplified by either a bundle or a 3 rose petal shape. 4 Are those all the aspects of 5 morphology as it relates to asbestos 6 minerals? 7 MR. FROST: Objection. 8 THE WITNESS: The only aspect 9 of morphology that applies -- that is 10 relevant to this identification of 11 asbestiform minerals is whether or not 12 the population of shapes expressed as 13 width versus length or aspect ratio 14 belongs to the population of 15 asbestiform or non-asbestiform 16 minerals. That is the only aspect of 17 morphology that's relevant to this 18 particular inquiry. 19 QUESTIONS BY MR. FINCH: 20 Q. Okay. And that population of 21 shapes, that is a statistical analysis you do 22 if you have enough structures to analyze for 23 purposes of aspect ratio, correct? 24 A. Correct. You cannot make a 25 firm diagnosis on the basis of an individual</p>	<p style="text-align: right;">Page 189</p> <p>1 A. I would want to go back and 2 look at some of the papers that I cited where 3 we talk about looking at populations. For 4 example, the R-93 document talks about 5 populations. One of these ISO documents 6 talks about populations. But I do not recall 7 specifically any of them having a number of 8 samples that you'd have to analyze. 9 We talk about this in my 10 statistics book. The number of samples that 11 you need for any given scenario is extremely 12 variable. 13 Q. So sitting here right now, 14 which is my one chance to take your 15 deposition before the Daubert hearing, you 16 don't know of any generally accepted or 17 relied upon standard which has a minimum 18 number of fibers or structures you need to 19 analyze in order to analyze the aspect ratios 20 to determine whether it's asbestiform or 21 non-asbestiform? 22 MR. FROST: Objection. 23 MR. LOCKE: Objection. 24 THE WITNESS: I would say you 25 need enough fibers to create a</p>

<p style="text-align: right;">Page 190</p> <p>1 distribution with an acceptable 2 standard deviation on the mean. 3 QUESTIONS BY MR. FINCH: 4 Q. Is 100 fibers or structures 5 sufficient to do that? 6 A. I think that's -- that's 7 subjective and it depends -- you know, it 8 depends on the particular profile of the 9 population. And it also depends on the 10 confidence with which you want to be able to 11 state your opinions or your conclusions. 12 Q. All right. At page 18, 13 footnote 34. 14 A. Page 18 of my report? 15 Q. Yes, page 18, footnote 34. 16 A. Uh-huh. 17 Q. You say, "The EDS results in 18 the Longo, Rigler MDL reports labeled as 19 tremolite may very well be consistent with 20 minerals other than diopside." 21 Do you know if diopside has 22 ever been found in any of the mines in 23 Vermont that Johnson & Johnson obtained talc 24 from? 25 A. No, I don't know anything about</p>	<p style="text-align: right;">Page 192</p> <p>1 talc mines. 2 QUESTIONS BY MR. FINCH: 3 Q. Do you know where in the world 4 bredigite is found? 5 A. No. 6 Q. Merwinite? 7 A. No. 8 Q. Rondorfite? 9 A. No. 10 Q. You don't know if any of those 11 minerals were ever found in any analysis 12 anyone's ever done of talc from Vermont used 13 by Johnson & Johnson, correct? 14 A. I believe I've made it clear 15 that I know nothing about the mineralogy of 16 any of the rocks in Vermont. 17 Q. Or that would go for Italy and 18 China as well? You know nothing about the 19 mineralogy of the talc mines Johnson & 20 Johnson sourced its talc from Italy or China? 21 A. That's correct. 22 May I add that although those 23 minerals are very rare, I continue in my 24 footnote to say many more common minerals 25 would be included in this list if iron and</p>
<p style="text-align: right;">Page 191</p> <p>1 the mineral assemblages present anywhere in 2 Vermont. 3 Q. You go on to say, "Dr. Longo 4 and Rigler might have never produced their 5 quantitative data and, accordingly, this 6 analysis cannot be completed, drop footnote 7 34. 8 "For example, these may include 9 at least monticellite, bredigite, merwinite 10 and rondorfite, which are other minerals that 11 contain only silicone, magnesium and 12 calcium." 13 A. That's what I say. 14 Q. All right. Do you know if -- 15 where in the world monticellite is found? 16 A. Actually, monticellite is found 17 in New York. I've collected it in the 18 Adirondacks just across the river from 19 Vermont. 20 Q. Do you know if it's ever been 21 found in any of the mines in Vermont that 22 Johnson & Johnson obtained its talc from? 23 MR. CHACHKES: Objection. 24 THE WITNESS: I know nothing 25 about the mineralogy of the Vermont</p>	<p style="text-align: right;">Page 193</p> <p>1 sodium were allowed. 2 So I specifically created this 3 example to be simple, but, in fact, in nature 4 there would be many, many minerals that would 5 be easily confused with tremolite on the 6 basis of an EDS analysis. 7 Q. All right. We were talking 8 about morphology a little while ago. 9 That's one way -- one analysis 10 that a scientist does to determine whether or 11 not material he or she is analyzing is 12 asbestos or not, right? It's one of the 13 pieces of the puzzle? 14 A. So, indeed, the criterion to be 15 lengthwise separable into flexible fibers 16 with high tensile strength and flexibility is 17 the definition of asbestos, then, yes, the 18 assessment of whether something is that sort 19 of fiber is relevant, yes. 20 Q. And one of the analyses that 21 goes into that is analysis of aspect ratios, 22 correct? 23 A. Aspect ratios are one way of 24 making that assessment, yes. 25 Q. Okay. And another analysis</p>

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<p>1 that a scientist can and should do to 2 determine whether or not the material he is 3 analyzing is asbestos or not is an analysis 4 of its chemical composition, correct? 5 A. So the definition of asbestos 6 includes chemical composition, crystal 7 structure and lengthwise separable into 8 flexible fibers with high tensile strength. 9 So to the extent that chemical 10 composition is part of identifying a specific 11 mineral species, then, yes, it's relevant. 12 Q. Amosite is one of the 13 well-accepted amphibole minerals that can be 14 asbestiform? 15 A. That is one of the six minerals 16 that's listed in the many lists in this 17 document, yes. 18 Q. Do you know whether amosite can 19 split both horizontally as well as 20 longitudinally? 21 MR. FROST: Objection. 22 THE WITNESS: I have no 23 explicit knowledge of amosite. There 24 was no mention of amosite in the Longo 25 and Rigler documents that I was asked</p>	<p>1 Q. And SAED is performed with 2 either a transmission electron microscope or 3 a SEM microscope? 4 A. Generally, yes. 5 Q. And the analyst has the 6 structure or bundle on the grid, or on 7 multiple grids, and is able to rotate it and 8 look at the SAED -- look at the crystalline 9 structure by SAED from different angles or 10 viewpoints, correct? 11 A. Sort of. 12 Q. What's a goniometer? 13 A. So a goniometer is something 14 that allows you to swivel something in 15 three-dimensional space. But on a TEM, the 16 space constraints are such that you can only 17 swivel it a very small amount. 18 Q. Does polarized light microscopy 19 allow you to determine whether or not a 20 structure or a fiber is asbestos or not? 21 A. PLM allows you to determine the 22 refractive index of a material, and it allows 23 you to say something about the dimensions of 24 an individual particle. But it tells you 25 nothing about the population distribution</p>
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<p>1 to review, and, therefore, I have no 2 opinion on that because I have not 3 investigated that question. 4 QUESTIONS BY MR. FINCH: 5 Q. The way one determines the 6 chemical composition of a fiber or structure 7 that one expects to potentially be asbestos 8 is using EDS, EDXA, correct? 9 A. So as I explained in my report, 10 EDS and EDXA are the only analytical -- 11 geo-analytical techniques that are high 12 enough in resolution to be able to say 13 anything about the chemical composition of a 14 very tiny particle. 15 Q. And that is a qualitative 16 analysis that is semi-quantitative at best, 17 correct? 18 A. Correct. 19 Q. A third step that a scientist 20 should undertake to determine whether or not 21 a particle or structure that he or she is 22 analyzing is asbestos is to analyze its 23 crystalline structure, correct? 24 A. Using a technique such as SAED, 25 yes.</p>	<p>1 and, therefore, couldn't tell you anything 2 about whether or not it was asbestiform or 3 non-asbestiform. 4 Q. But if you have a sample of 5 material and you combine all four different 6 analysis - morphology, the chemical 7 composition analysis using EDS, EDXA, the 8 crystal structure analysis using SAED, and a 9 polarized light microscope analysis of the 10 material, the same -- the sample - would that 11 give you a high level of confidence that what 12 you were looking at was asbestos if it was 13 consistent with the regulated asbestos 14 materials as measured by morphology, chemical 15 composition, crystal structure and refractive 16 index? 17 MR. CHACHKES: Objection. 18 THE WITNESS: Well, that's 19 quite a mouthful of a sentence. 20 Boy. If done correctly. But, 21 of course, the methodology used in the 22 Longo, Rigler report was not done 23 correctly. 24 For example, you say SAED. 25 Well, a single SAED analysis is not</p>

<p style="text-align: right;">Page 198</p> <p>1 enough to identify a mineral. So if 2 you only had one SAED, then you 3 couldn't identify asbestos, et cetera, 4 et cetera. 5 If you only had one measurement 6 of the dimensions of the particle, you 7 wouldn't know anything about the 8 population from which it was drawn 9 and, therefore, you could not 10 determine if it came -- if it was 11 asbestos. 12 So that's a general -- 13 generalized question that is 14 impossible to answer. But I can 15 certainly say that with the individual 16 measurements -- or with the methods 17 used in the -- used by Drs. Longo and 18 Rigler, no, you cannot determine if 19 something is asbestos. 20 Moreover, I will also say that 21 each of those techniques perhaps 22 identifies maybe 250 to 500 different 23 possible minerals -- I'm just making 24 those numbers up -- and they're the 25 same 250 to 500 minerals because they</p>	<p style="text-align: right;">Page 200</p> <p>1 having only two dimensions is not diagnostic, 2 which is the point of the data I present in 3 this report to show that there are many, many 4 minerals that satisfy the D spacing criteria 5 that Dr. Longo uses. 6 Q. All right. The D spacing is 7 the space -- the distance between the atoms, 8 correct? 9 A. Distance between layers of 10 atoms, yes. 11 Q. And the zone axis measurement 12 is the measurement of the angles? 13 A. The zone axis measurement just 14 refers to the way the crystal was positioned 15 at the time the X-ray pattern was collected 16 relative to the crystal structure itself. 17 Q. And you -- and you say that the 18 Yamate 3 methodology for confirming the 19 presence of asbestos in talc requires two 20 SAED zone axis determination and an EDS 21 analysis, correct? 22 A. That's what the Yamate 23 statement says. And if you'd like, we can 24 take a look at that together. 25 Q. Well, we'll get to there in a</p>
<p style="text-align: right;">Page 199</p> <p>1 all have very similar compositions, 2 crystal structures, et cetera, et 3 cetera. 4 So this methodology is 5 fundamentally flawed. 6 QUESTIONS BY MR. FINCH: 7 Q. Are you saying the -- let me 8 focus on the SAED. 9 What's the basis for your 10 statement in your report at page 29 and 40 11 that -- 12 A. You mean 29 and 30? 13 Q. 29 and 40. You say it in two 14 different places. 15 A. Oh. 16 Q. You cite to Yamate for the 17 proposition that SAED requires at least two 18 zone axes in order to make a determination of 19 the crystalline structure. 20 A. Yes, that's correct. 21 Q. What's the basis for that 22 statement? 23 A. One SAED pattern only tells you 24 two dimensions of what is a three-dimensional 25 crystal structure lattice. As it happens,</p>	<p style="text-align: right;">Page 201</p> <p>1 minute. 2 Other than Yamate, 1984, can 3 you point me to any generally recognized 4 standard or peer-reviewed literature that 5 says that you have to have two SAED zone axis 6 determinations for every particle that one is 7 analyzing using SAED? 8 A. So I would imagine that every 9 mineralogy book ever written about 10 crystallography explains that minerals are 11 three-dimensional structures, and it's always 12 necessary to know all three directions in 13 order to identify a mineral. 14 Books that come to mind include 15 probably the Hurlbut and Klein textbook that 16 you already have, Bloss' optical 17 crystallography book, certainly my book. 18 And many other sources would 19 tell you that just because a mineral has one 20 particular dimension, which is basically what 21 Dr. Longo provides in the diffraction 22 verification document, no conclusions can be 23 drawn regarding identification. 24 Q. With respect to asbestos 25 specifically, can you identify anything</p>

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<p>1 besides Yamate that states that you need two</p> <p>2 SAED zone axis determinations in order to --</p> <p>3 and an EDS analysis in order to make a</p> <p>4 determination that a material is asbestos?</p> <p>5 MR. FROST: Objection.</p> <p>6 THE WITNESS: I'm sure I could</p> <p>7 find some citations. It's such a</p> <p>8 common, obvious thing that I don't</p> <p>9 think anyone would write a</p> <p>10 peer-reviewed paper to even say that.</p> <p>11 QUESTIONS BY MR. FINCH:</p> <p>12 Q. You haven't listed anything</p> <p>13 other than Yamate in your report; is that</p> <p>14 correct?</p> <p>15 A. To support this particular</p> <p>16 point, no, because it's common knowledge</p> <p>17 among crystallographers.</p> <p>18 Q. All right. You have Yamate. I</p> <p>19 think it's Exhibit --</p> <p>20 A. 7.</p> <p>21 Q. 7.</p> <p>22 You were quoting from page 44?</p> <p>23 A. Uh-huh.</p> <p>24 Q. "The protocol states that the</p> <p>25 identification requires two SAED zone axis</p>	<p>1 near exact zone orientations be done for</p> <p>2 every structure that one is looking at?</p> <p>3 A. That's what it says.</p> <p>4 Q. Could you turn to the next</p> <p>5 page?</p> <p>6 A. It says "from each selected</p> <p>7 fiber."</p> <p>8 Q. Turn to the next page in</p> <p>9 Yamate.</p> <p>10 A. (Witness complies.)</p> <p>11 Q. Under point 5 it says, "It is</p> <p>12 recommended that approximately 20 percent, at</p> <p>13 least 10 percent of the fibers examined in</p> <p>14 level 2 analysis, be selected for level 3</p> <p>15 SAD -- SAED analysis. Fibers which would be</p> <p>16 classified as amphiboles are ambiguous in</p> <p>17 level 2 analysis should be more often</p> <p>18 included for level 3 analysis as compared to</p> <p>19 those fibers which could readily be</p> <p>20 identified as not asbestos."</p> <p>21 Do you see that?</p> <p>22 A. I see that.</p> <p>23 So let's take this back to</p> <p>24 what's actually in the Longo, Rigler reports.</p> <p>25 So in point of fact, there are</p>
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<p>1 determinations and an EDS analysis."</p> <p>2 You're referring to the -- I'm</p> <p>3 on page 41. You're referring to the Yamate</p> <p>4 protocol, right?</p> <p>5 A. Oh, wait a minute. Are we</p> <p>6 talking about my report now?</p> <p>7 Q. I'm looking at your report,</p> <p>8 page 41, and it says, "The protocol,"</p> <p>9 referring to Yamate, "states that</p> <p>10 identification requires two SAED zone axis</p> <p>11 determinations."</p> <p>12 A. Yes, that's what it says.</p> <p>13 Q. Okay. And where does it say</p> <p>14 that in Yamate?</p> <p>15 A. Oh, let's take a look here.</p> <p>16 On page 44 it says, "The level</p> <p>17 3 analytical procedure consists of locating</p> <p>18 the selected fibers," blah-blah-blah,</p> <p>19 "obtaining and according two zone axis SAED</p> <p>20 patterns from each selected fiber, and</p> <p>21 obtaining, recording and photographing</p> <p>22 representative EDS spectra from the subject</p> <p>23 fiber."</p> <p>24 Q. Okay. Does the Yamate criteria</p> <p>25 require that SAED analysis from two different</p>	<p>1 no individual fibers for which two SAED</p> <p>2 patterns are given. And in fact, only after</p> <p>3 the fact were any diffraction verification</p> <p>4 documents given, and I don't believe that</p> <p>5 they represent even 20 percent of the</p> <p>6 particles identified by Drs. Longo and</p> <p>7 Rigler. So their methodology is flawed on</p> <p>8 many counts relating to this.</p> <p>9 Q. Isn't it true that the SAED</p> <p>10 diffraction verification documents that Longo</p> <p>11 and Rigler provided consist of more than</p> <p>12 10 percent of the total number of structures</p> <p>13 they analyzed?</p> <p>14 A. I believe they only looked at</p> <p>15 six out of the 70-odd samples that they</p> <p>16 studied, so six out of 70-odd is not quite</p> <p>17 10 percent. I don't have the exact numbers</p> <p>18 in my head.</p> <p>19 Q. ISO 22262-1 is a publication</p> <p>20 that you at least cite to and rely on in your</p> <p>21 discussion of Dr. Rigler and Dr. Longo's</p> <p>22 work, correct?</p> <p>23 MR. FROST: Objection.</p> <p>24 THE WITNESS: I certainly point</p> <p>25 out where their methodology is</p>

52 (Pages 202 to 205)

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<p>1 consistent and inconsistent with 2 what's in this report, yes. 3 QUESTIONS BY MR. FINCH: 4 Q. Could you turn to page 64 of 5 what's been marked as Exhibit 4, ISO 22262-1? 6 A. Section F 3? 7 Q. Yes. 8 What is it talking about in 9 section F 3? 10 A. Electron diffraction. 11 Q. Is that another name for SAED? 12 A. In this context, yes. 13 Q. Okay. One, two, three, four, 14 five paragraphs down -- 15 A. Uh-huh. 16 Q. -- ISO 22262-1 states, "ED," 17 referring to electron diffraction patterns, 18 "can be particularly useful for 19 differentiating fibrous talc from 20 anthophyllite asbestos, both of which have 21 similar EDXA spectra." 22 First of all, do you agree that 23 fibrous talc and anthophyllite asbestos have 24 similar EDXA spectra? 25 A. I agree that talc and</p>	<p>1 amounted in the appropriate holder" -- 2 MR. CHACHKES: Mounted. 3 QUESTIONS BY MR. FINCH: 4 Q. -- "mounted in the appropriate 5 holder." 6 And then it goes on to describe 7 the complete rotation of the specimen grid 8 and the tilting of the grid about a single 9 axis. 10 Do you see that? 11 A. Yes. 12 Q. And it instructs the analyst to 13 tilt the fiber until an ED pattern appears, 14 which is a symmetrical, two-dimensional -- 15 which is a symmet -- two words, a, space, 16 symmetrical, two-dimensional array of spots. 17 The recognition of zone axis alignment 18 conditions require some experience on the 19 part of the operator. 20 Do you agree with that? 21 A. Yes. Although we teach 22 students to do that. 23 Q. And you agree with me that 24 what's going on here is the analyst is 25 tilting the structure around in realtime,</p>
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<p>1 anthophyllite have similar EDS spectra 2 because, of course, that's all you can say 3 about those methods. They only look at 4 chemistry. So all I can say is that 5 chemically, talc and anthophyllite can be 6 quite similar. 7 Q. Then going on to, "Electron 8 diffraction of talc produces a pseudo 9 hexagonal pattern that does not change as the 10 fiber is tilted using the goniometer. 11 Anthophyllite asbestos, on the other hand, 12 produces assorted spots appearing and 13 disappearing along layer lines as the fiber 14 is tilted using the goniometer." 15 That refers to the analyst 16 looking at the sample in the transmission 17 electron microscope and tilting it, correct? 18 A. That's what it refers to, yes. 19 Q. All right. The next two 20 sentences deal with chrysotile, so I'm going 21 to skip those. 22 "Analysis of laboratory samples 23 seldom requires zone axis measurements. 24 However, if a zone axis ED analysis is to be 25 attempted on the fiber, the sample should be</p>	<p>1 looking at it through the transmission 2 electron microscope to look -- to see whether 3 or not when he or she adjusts the goniometer 4 that the -- whether or not the hexagonal 5 pattern changes or not? 6 A. Sort of. 7 What's going on is that you're 8 trying to tilt the sample so that rows of 9 atoms in the sample are perpendicular to the 10 beam of electrons. That's what you're doing. 11 And that satisfies the 12 diffraction condition and, therefore, gives a 13 pattern of spots. 14 Q. All right. On page 65 -- 15 A. Uh-huh. 16 Q. -- the standard states, "If the 17 results obtained from one ED pattern do not 18 resolve any ambiguity in the identification 19 of a fiber, a second ED pattern obtained at a 20 different orientation of the fiber can be 21 examined, and the observed tilt angle between 22 the two orientations can be compared with the 23 theoretical angle calculated from the 24 suspected crystal structure." 25 Do you see that?</p>

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<p>1 A. Actually, I don't see where 2 that is, but -- 3 Q. Page 65. 4 A. Yeah, I'm looking at it. 5 Q. Bottom paragraph. 6 A. Oh, at the bottom. Yes. Okay. 7 Q. All right. 8 A. Where it's talking about using 9 a computer program to do this, yes. 10 Q. What it says is, "If the 11 results obtained from one ED pattern do not 12 resolve any ambiguity in the identification 13 of a fiber, a second ED pattern obtained at a 14 different orientation of the fiber can be 15 examined." 16 Would you agree with me that 17 "can" does not say "shall" or "must"? 18 A. I agree with you that it says 19 "can," but I believe you're proving the point 20 I made in my report, which is that crystal 21 structures are inherently three-dimensional, 22 and you cannot identify a specific mineral 23 species on the basis of only one orientation. 24 Q. But how do you -- what's -- 25 what is the basis for your conclusion that</p>	<p>1 that ISO 22262-1 at page 64 says that at 2 least when you're examining anthophyllite 3 asbestos versus talc, it becomes apparent by 4 tilting the goniometer which is which because 5 the image does not change if it's talc, if 6 the fiber is tilted? 7 MR. LOCKE: Objection. 8 THE WITNESS: So let's 9 decompose that question a little bit. 10 First of all, it is true that 11 at specific orientations the 12 diffraction patterns of talc and 13 anthophyllite can look quite similar. 14 It is also true that if you 15 tilt the stage, you may not see the 16 same pattern of spots for talc and 17 anthophyllite. 18 But it all goes back to the 19 point I make in my report, which is 20 that if you only have one of these 21 patterns, it doesn't matter how hard 22 you work to get it, one pattern is not 23 enough to identify a three-dimensional 24 structure, because one pattern can 25 only physically tell you about two</p>
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<p>1 the analysts that were looking at the 2 crystalline structure in realtime using SEM 3 in Dr. Longo's lab were not turning the 4 goniometer to look at it from multiple 5 perspectives? 6 Do you have any basis for 7 concluding that they weren't doing that? 8 A. My basis for concluding that is 9 that they only include one image for each 10 crystal. Therefore, there is no evidence in 11 any of their reports that they did multiple 12 zone axis measurements. 13 Q. So what you're saying is 14 because there's not more than one image, that 15 means that they didn't look at it from two 16 different angles, as ISO 22262-1 discusses at 17 page 64? 18 A. Precisely. And that is the 19 point I make in my report, that they do not 20 look at more than one zone axis on any 21 individual crystal. 22 Q. Well, you're just assuming 23 that, aren't you? They just -- they didn't 24 take a picture of a different zone axis. 25 But wouldn't you agree with me</p>	<p>1 dimensions. 2 MR. CHACHKES: And by the way, 3 we've been going a little over an 4 hour, if you reach a natural breaking 5 point. 6 MR. FINCH: Yeah, this is a 7 good breaking point. 8 MR. CHACHKES: Thank you. 9 VIDEOGRAPHER: Okay. The time 10 is 2:24 p.m. Off the record. 11 (Off the record at 2:24 p.m.) 12 VIDEOGRAPHER: Okay. We are 13 back on the record. The time is 14 2:46 p.m. 15 QUESTIONS BY MR. FINCH: 16 Q. Good afternoon, Professor Darby 17 Dyar. We're back on the record after a short 18 break. 19 On page 32 of your expert 20 witness report, you write that "The SAED 21 patterns are labeled with mineral species 22 names using only visual inspections based on 23 operator experience, methodology for which 24 the Longo, Rigler MDL report cite no support. 25 This practice may be able to distinguish</p>

<p style="text-align: right;">Page 214</p> <p>1 among species for materials that are already 2 known to contain asbestos, but it may fail in 3 the applications where the spectrum of 4 possible mineralogy is broad." 5 That's what you write, correct? 6 A. That's what I write. 7 Q. What is the basis for your 8 statement that the spectrum of possible 9 mineralogy is broad in the talc mines in 10 Vermont, in Italy, from which Johnson & 11 Johnson obtained its talc? 12 MR. CHACHKES: Objection. 13 THE WITNESS: So because I know 14 nothing about the mineralogy in those 15 localities, all I can say is this 16 general statement, which is that 17 looking at an SAED pattern, which is 18 what Longo and Rigler and their 19 associates admittedly do in their 20 deposition, makes it difficult to 21 distinguish mineral species in 22 applications where the spectrum of 23 possible mineralogy is broad. 24 QUESTIONS BY MR. FINCH: 25 Q. What about in the -- in the</p>	<p style="text-align: right;">Page 216</p> <p>1 different species, correct? 2 MR. CHACHKES: Objection. 3 THE WITNESS: I do use the word 4 "may," and I would say that if you 5 handed me a clump of asbestos and 6 asked me to determine which of the six 7 mineral species it was, I might be 8 able to do -- to use SAED to identify 9 which of the six it was, which is why 10 I deliberately used the word "may" 11 fail. 12 QUESTIONS BY MR. FINCH: 13 Q. Am I correct that you have no 14 basis for your conclusion that the spectrum 15 of possible mineralogy in the Vermont source 16 talc used by Johnson & Johnson -- strike 17 that. 18 Am I correct that you have no 19 basis for your statement in your report that 20 the spectrum of possible mineralogy is broad 21 when it comes to the sources of talc used by 22 Johnson & Johnson? 23 MR. CHACHKES: Objection. 24 THE WITNESS: I stand by my 25 statement because, for example, there</p>
<p style="text-align: right;">Page 215</p> <p>1 spectrum where the possible mineralogy is not 2 broad, as in the case of a Vermont talc mine 3 where a handful of accessory minerals have 4 been identified and that's it? 5 MR. CHACHKES: Objection. 6 MR. LOCKE: Objection. 7 THE WITNESS: Well, I don't 8 know anything about the mineralogy of 9 Vermont talc mines, and so I can't say 10 that there's any independent 11 constraints because I don't know that 12 that is the case. 13 QUESTIONS BY MR. FINCH: 14 Q. Okay. So you do say that "This 15 practice, i.e., analyzing SAED patterns based 16 on operator experience, may be able to 17 distinguish among species for materials that 18 are already known to contain asbestos." 19 So presumably you agree that if 20 the operators already know based on some 21 source that asbestos is among the possible 22 materials in the mix of the sample they're 23 looking for, using SAED to label mineral 24 species with names using visual inspection 25 may be able to distinguish among the</p>	<p style="text-align: right;">Page 217</p> <p>1 are more than a hundred amphibole 2 minerals. It would be very difficult 3 to distinguish them by SAED. 4 And as far as I'm aware, I know 5 nothing about the mineralogy of talc 6 mines from which these particular 7 samples that Drs. Longo and Rigler 8 tested. So to me, the spectrum of 9 possible mineralogy is quite broad. 10 QUESTIONS BY MR. FINCH: 11 Q. Of those hundred amphibole 12 minerals, how many of them have the same 13 chemical signature as anthophyllite or 14 tremolite and an SAED diffraction pattern 15 that is consistent with asbestos and 16 morphology that has structures which have 17 aspect ratios on average greater than 7 to 1 18 and that on PLM are determined to be 19 consistent with asbestos? 20 How many of the hundred 21 amphibole minerals you just talked about meet 22 all those criteria? 23 MR. CHACHKES: Objection. 24 THE WITNESS: Wow, that's 25 another omnibus question, so let's</p>

<p style="text-align: right;">Page 218</p> <p>1 break that down a little bit. 2 So chemically, any of the 3 amphibole minerals that are either 4 magnesium, iron and calcium-bearing or 5 just magnesium and iron-bearing would 6 all be indistinguishable by EDS. 7 If you had one SAED pattern, 8 which most of the data in the 9 diffraction verification document of 10 Dr. Longo's have, they only show one 11 particular orientation that is common 12 to, as we noted in my document, 13 25 percent of all minerals in the 14 database from our book. 15 So let's see. What else did 16 you ask? 17 Let's see. And then 18 morphology, "has structures which have 19 aspect ratios" -- so we haven't even 20 really talked about counting criteria, 21 which is really what you're -- what 22 you're specifying here, 7 to 1. I'm 23 not sure where that number is coming 24 from. 25 And then when you say "on PLM</p>	<p style="text-align: right;">Page 220</p> <p>1 MR. FINCH: Objection. Move to 2 strike. 3 QUESTIONS BY MR. FINCH: 4 Q. My question was: How many, 5 sitting here today, can you tell me would 6 meet all four of the criteria that I just 7 laid out? 8 MR. LOCKE: Objection. 9 MR. CHACHKES: Objection. 10 THE WITNESS: So your criteria 11 were simply just names of techniques. 12 They weren't specific about the names 13 and techniques. 14 So if you want to tell me what 15 it is about SAED and what it is about 16 PLM and what it is about morphology, 17 et cetera, et cetera, for each of 18 those, then I could probably answer 19 your question. I'd be happy to. 20 QUESTIONS BY MR. FINCH: 21 Q. Do you know as you sit here 22 today how many different minerals have been 23 identified in Vermont-sourced talc or 24 Italian-sourced talc that went into Johnson's 25 baby powder?</p>
<p style="text-align: right;">Page 219</p> <p>1 are determined to be consistent with 2 asbestos," again, on PLM you can tell 3 something about morphology because you 4 can measure the dimensions of the 5 grain, and if you use an array of 6 refracted index oils, you can tell 7 something about composition with PLM. 8 So those are answers to your 9 individual question, and I think it's 10 too vague to try to give a straight 11 answer to your original question as 12 posed. 13 QUESTIONS BY MR. FINCH: 14 Q. So sitting here today, you 15 can't give me a number as to how many of the 16 hundred amphiboles that exist would meet all 17 those criteria? 18 MR. LOCKE: Objection. 19 MR. FROST: Objection. 20 THE WITNESS: I would say, for 21 example, that all of the 100 amphibole 22 minerals would meet the SAED one zone 23 axis angles -- or values that are in 24 the diffraction verification documents 25 because they're all amphiboles.</p>	<p style="text-align: right;">Page 221</p> <p>1 A. I have no knowledge of the 2 mineralogy of those deposits or, in fact, any 3 talc deposits. 4 Q. So it could be three minerals, 5 it could be five minerals, it could be ten 6 minerals; you have no knowledge, correct? 7 MR. CHACHKES: Objection. 8 MR. LOCKE: Objection. 9 THE WITNESS: Correct. I 10 believe we've established that I don't 11 know anything about the mineralogy of 12 Vermont or any other talc deposits, 13 aside from the fact that they contain 14 talc. 15 QUESTIONS BY MR. FINCH: 16 Q. Have you ever heard of McCrone 17 Laboratories or Walter McCrone Associates? 18 A. Yes. 19 Q. Do you regard them as a 20 well-respected laboratory for the purposes of 21 analyzing materials to determine whether or 22 not they contain asbestos or other 23 contaminants? 24 A. I don't know anything about 25 that aspect of what they do. I'm only</p>

<p style="text-align: right;">Page 222</p> <p>1 familiar with the fact that they teach</p> <p>2 classes in optical microscopy.</p> <p>3 Q. And they teach classes in how</p> <p>4 to use a microscope to identify materials,</p> <p>5 correct?</p> <p>6 A. They teach classes in how to do</p> <p>7 fundamental measurements on a microscope,</p> <p>8 yes.</p> <p>9 Q. Have you ever attended a class</p> <p>10 taught by Walter McCrone and Associates or</p> <p>11 McCrone?</p> <p>12 A. I teach my own classes on</p> <p>13 optical microscopy, so, no, I have no need</p> <p>14 and, therefore, have never attended a class</p> <p>15 taught by McCrone or anyone having to do with</p> <p>16 McCrone.</p> <p>17 Q. Have you ever heard any</p> <p>18 significant criticisms of their laboratories</p> <p>19 in your field?</p> <p>20 A. McCrone is not an academic</p> <p>21 laboratory. It's not something that research</p> <p>22 scientists do. Optical microscopy is</p> <p>23 generally in the toolkit of mineralogy</p> <p>24 researchers, and so there would no need to</p> <p>25 use any laboratory. And, therefore, I barely</p>	<p style="text-align: right;">Page 224</p> <p>1 Q. And 18 is?</p> <p>2 A. November 5th.</p> <p>3 Q. All right. I want to do them</p> <p>4 20 -- I'm going to do them in reverse</p> <p>5 chronological order, going backward in time,</p> <p>6 so starting with Exhibit 20.</p> <p>7 Do you have that?</p> <p>8 A. I do.</p> <p>9 Q. This is a May 24, 1976 letter</p> <p>10 to Walter McCrone Associates from Roger</p> <p>11 Miller, who was the president of Windsor</p> <p>12 Minerals.</p> <p>13 Do you see that?</p> <p>14 A. That's what it looks like, yes.</p> <p>15 Q. Do you have any understanding</p> <p>16 of who Roger Miller is or what Windsor</p> <p>17 Minerals is?</p> <p>18 A. Never heard of him.</p> <p>19 Q. All right. If I were to</p> <p>20 represent to you that Windsor Minerals was a</p> <p>21 Johnson & Johnson subsidiary that owned the</p> <p>22 mines from which it mined talc for cosmetic</p> <p>23 talc, do you have anything to dispute that</p> <p>24 statement?</p> <p>25 MR. CHACHKES: Objection.</p>
<p style="text-align: right;">Page 223</p> <p>1 know of McCrone.</p> <p>2 Q. Oh, so you haven't -- as you</p> <p>3 sit here today, there's not any criticisms</p> <p>4 you have or you can think of of McCrone</p> <p>5 Associates?</p> <p>6 A. I don't have enough information</p> <p>7 to have an opinion.</p> <p>8 (Dyar Exhibits 18, 19 and 20</p> <p>9 marked for identification.)</p> <p>10 QUESTIONS BY MR. FINCH:</p> <p>11 Q. All right. I've marked what's</p> <p>12 been Exhibits 20 --</p> <p>13 MR. CHACHKES: 18.</p> <p>14 QUESTIONS BY MR. FINCH:</p> <p>15 Q. -- 18 and 19.</p> <p>16 MR. CHACHKES: Yeah.</p> <p>17 QUESTIONS BY MR. FINCH:</p> <p>18 Q. Yeah. 20 is a May 24, 1976</p> <p>19 document; is that right?</p> <p>20 A. Oh, wait. 20 you want to go to</p> <p>21 first?</p> <p>22 Q. Yes.</p> <p>23 A. Yes, it says May 24th.</p> <p>24 Q. Okay. And 19, which one is 19?</p> <p>25 A. 19 is July 1, 1975.</p>	<p style="text-align: right;">Page 225</p> <p>1 THE WITNESS: I can neither</p> <p>2 affirm nor dispute that statement.</p> <p>3 QUESTIONS BY MR. FINCH:</p> <p>4 Q. All right. Exhibit 20 states</p> <p>5 that "The samples which are relevant to the</p> <p>6 production and sale of cosmetic talc in the</p> <p>7 US and Canadian markets are those bearing the</p> <p>8 letters HC as part of their prefix. The</p> <p>9 dates included in the identifier are the</p> <p>10 dates on which the material was processed."</p> <p>11 Do you see that?</p> <p>12 A. You read that correctly, yes.</p> <p>13 Q. Okay. So this is the president</p> <p>14 of Windsor Minerals writing to the people at</p> <p>15 McCrone Associates what the terminology in</p> <p>16 the letter means, what HC means, correct?</p> <p>17 A. That's what it appears. The</p> <p>18 letter's not signed.</p> <p>19 Q. Back in the 1970s, wasn't it a</p> <p>20 common practice when people wrote letters</p> <p>21 that there be a carbon copy and sometimes</p> <p>22 the -- there wasn't -- the Xerox machine was</p> <p>23 not as ubiquitous as it is now, and you</p> <p>24 wouldn't always have the signed copy in the</p> <p>25 file?</p>

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<p>1 MR. CHACHKES: Objection.</p> <p>2 THE WITNESS: It's perfectly</p> <p>3 easy to sign a carbon copy.</p> <p>4 QUESTIONS BY MR. FINCH:</p> <p>5 Q. Be that as it may, Windsor</p> <p>6 Minerals -- you see this is -- this is a</p> <p>7 document produced from the files of Johnson &</p> <p>8 Johnson at the bottom?</p> <p>9 MR. FROST: Objection.</p> <p>10 QUESTIONS BY MR. FINCH:</p> <p>11 Q. J&J talc?</p> <p>12 A. I have -- I have no knowledge</p> <p>13 of that, other than your assertion and this</p> <p>14 cryptic notation which looks like it was</p> <p>15 added after the fact.</p> <p>16 Q. Turning now to Exhibit 18, and</p> <p>17 keep Exhibit 20 handy.</p> <p>18 "This letter will supplement</p> <p>19 our report of 1 July 1975 on a series of talc</p> <p>20 ore samples which we have analyzed for you.</p> <p>21 Table 1 shows the actual fiber counts and the</p> <p>22 approximate equivalent concentration in parts</p> <p>23 per million of amphibole particles which we</p> <p>24 found in these samples. Some of them seem</p> <p>25 rather high. Most of these come in bundles</p>	<p>1 these two documents.</p> <p>2 For example, after this</p> <p>3 testing, were these samples actually</p> <p>4 used? I can't tell.</p> <p>5 It says "amphibole." Which</p> <p>6 amphibole? Is it one of the regulated</p> <p>7 amphibole minerals?</p> <p>8 QUESTIONS BY MR. FINCH:</p> <p>9 Q. It says "fibers of asbestos,"</p> <p>10 correct?</p> <p>11 A. It does say "fibers of</p> <p>12 asbestos." I would ask, how are they</p> <p>13 defining that?</p> <p>14 This was 1975, and there's no</p> <p>15 explicit explanation here, so I would wonder</p> <p>16 how they defined that.</p> <p>17 So there's many murky things</p> <p>18 about this document that make me feel like</p> <p>19 it's being taken out of context.</p> <p>20 Q. And if you were going to</p> <p>21 analyze this document as a scientist, isn't</p> <p>22 it correct that you would want to see the</p> <p>23 photomicrographs that McCrone and Associates</p> <p>24 took and their analyses, both chemical</p> <p>25 analyses and any other analyses, they</p>
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<p>1 of one, two or three fibers, anything from</p> <p>2 two to five amphiboles in a bundle."</p> <p>3 And it's reporting on the</p> <p>4 results from McCrone to the Windsor Mineral</p> <p>5 Company, correct?</p> <p>6 A. Apparently.</p> <p>7 Q. All right. And on Table 1 on</p> <p>8 the second page of the document, the back</p> <p>9 page, there is a column labeled "Fibers of</p> <p>10 Asbestos"?</p> <p>11 A. That's what it says.</p> <p>12 Q. And then it -- by</p> <p>13 cross-referencing the tabs, you can take the</p> <p>14 sample numbers and if it's -- see whether</p> <p>15 it's HC or GI or WI?</p> <p>16 A. Yes, I see that.</p> <p>17 Q. All right. Does this document</p> <p>18 suggest to you that McCrone and Associates</p> <p>19 identified fibers of asbestos in samples of</p> <p>20 ore from a Vermont mine owned by the Windsor</p> <p>21 Mineral Company which were used in the</p> <p>22 production of cosmetic talc, HC?</p> <p>23 MR. FROST: Objection.</p> <p>24 THE WITNESS: I have no</p> <p>25 knowledge of the connection between</p>	<p>1 provided on the documents?</p> <p>2 MR. CHACHKES: Objection.</p> <p>3 THE WITNESS: Well, I would ask</p> <p>4 why, as a scientist, I would want to</p> <p>5 analyze something like this. I would</p> <p>6 much prefer to analyze a formal</p> <p>7 report.</p> <p>8 QUESTIONS BY MR. FINCH:</p> <p>9 Q. If there were a formal report</p> <p>10 that once upon a time went along with this</p> <p>11 and contained photomicrographs -- you okay,</p> <p>12 ma'am? -- or count -- or count sheets or</p> <p>13 diffraction patterns, would that be</p> <p>14 information that you would want to consider</p> <p>15 to analyze whether or not this letter report</p> <p>16 from McCrone is accurate and reliable?</p> <p>17 MR. CHACHKES: Objection.</p> <p>18 THE WITNESS: I don't know.</p> <p>19 We're going far outside the scope of</p> <p>20 my remit here, which is to evaluate</p> <p>21 methodology. But I would say, again,</p> <p>22 there's no context here. There's</p> <p>23 no -- I have no way of knowing whether</p> <p>24 the samples in this report are ones</p> <p>25 that were ever even involved in a mine</p>

58 (Pages 226 to 229)

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<p>1 or even used in commercial production.</p> <p>2 There's not enough information here to</p> <p>3 make a judgment.</p> <p>4 And if they weren't used, then</p> <p>5 there wouldn't be any -- need to be</p> <p>6 any more information.</p> <p>7 QUESTIONS BY MR. FINCH:</p> <p>8 Q. But in order to understand the</p> <p>9 context, you agree with me that it would be</p> <p>10 useful to have the backup data that underlies</p> <p>11 this report?</p> <p>12 MR. CHACHKES: Objection.</p> <p>13 THE WITNESS: I'm still not</p> <p>14 understanding why I would want to be</p> <p>15 examining this report. I'm supposed</p> <p>16 to be evaluating methodology here, and</p> <p>17 you're asking me to evaluate a random</p> <p>18 report with no context about which I</p> <p>19 know nothing.</p> <p>20 There's nothing in here to</p> <p>21 indicate that the samples they're</p> <p>22 talking about were ever -- ever even</p> <p>23 had anything to do with talc that was</p> <p>24 actually produced from Vermont mines</p> <p>25 or anywhere else.</p>	<p>1 misrepresenting the documents.</p> <p>2 So with that note...</p> <p>3 THE WITNESS: I choose not to</p> <p>4 answer.</p> <p>5 QUESTIONS BY MR. FINCH:</p> <p>6 Q. You have not, as part of your</p> <p>7 work in this case, asked Johnson & Johnson</p> <p>8 for all of the testing results that have ever</p> <p>9 been done on either the talc ore or the baby</p> <p>10 powder product itself, correct?</p> <p>11 A. So my role here was to evaluate</p> <p>12 methodology used by Longo and Rigler. It was</p> <p>13 not to evaluate testing protocols used by</p> <p>14 Johnson & Johnson.</p> <p>15 I have no opinion of -- no</p> <p>16 knowledge of those and no opinion on those.</p> <p>17 Q. Are you familiar with the</p> <p>18 testing protocol J41 -- J4-1?</p> <p>19 A. I don't believe so.</p> <p>20 Q. It's the testing protocol that</p> <p>21 the talc manufacturers voluntarily put into</p> <p>22 place in the mid-'70s for the analysis of</p> <p>23 asbestos in talc.</p> <p>24 Are you familiar with that?</p> <p>25 MR. LOCKE: Objection.</p>
Page 231	Page 233
<p>1 QUESTIONS BY MR. FINCH:</p> <p>2 Q. I want you to assume that these</p> <p>3 documents are contemporaneous reports of</p> <p>4 McCrone analyses of talc from the very mines</p> <p>5 that Johnson & Johnson used to source its</p> <p>6 baby powder in the 1970s, and that in</p> <p>7 Exhibits 18 and 19 McCrone states that they</p> <p>8 found fibers of asbestos, in the case of</p> <p>9 Exhibit 18, and Exhibit 19, confirmed</p> <p>10 asbestos visual on page 2, in multiple</p> <p>11 samples of talc ore from the Vermont mines</p> <p>12 that were used to source cosmetic talcum</p> <p>13 products.</p> <p>14 A. So --</p> <p>15 MR. CHACHKES: So -- go ahead.</p> <p>16 QUESTIONS BY MR. FINCH:</p> <p>17 Q. So based on that set of</p> <p>18 assumptions, Doctor, do you have any basis to</p> <p>19 say that this is not evidence that one of the</p> <p>20 minerals that can potentially be found in</p> <p>21 talc from Vermont is amphibole asbestos?</p> <p>22 MR. CHACHKES: So objection.</p> <p>23 You don't have to take those</p> <p>24 assumptions.</p> <p>25 You shouldn't be</p>	<p>1 MR. CHACHKES: Objection.</p> <p>2 THE WITNESS: No.</p> <p>3 QUESTIONS BY MR. FINCH:</p> <p>4 Q. If I were to tell you that it</p> <p>5 is a combination of XRD and optical</p> <p>6 microscopy, is the J4 method, would you agree</p> <p>7 with me that those two methodologies would</p> <p>8 not be able to detect asbestos fibers in talc</p> <p>9 at a concentration below 0.1 percent?</p> <p>10 MR. CHACHKES: Objection.</p> <p>11 MR. LOCKE: Objection.</p> <p>12 THE WITNESS: Oh, I would need</p> <p>13 a lot more information than your</p> <p>14 random statement that it meets XRD and</p> <p>15 optical microscopy. I'd need to</p> <p>16 examine that document to be able to</p> <p>17 render an opinion.</p> <p>18 QUESTIONS BY MR. FINCH:</p> <p>19 Q. You're not -- I think you just</p> <p>20 said two questions ago you're not giving any</p> <p>21 opinions that Johnson & Johnson's historical</p> <p>22 methodologies for testing its talc for the</p> <p>23 presence of asbestos are accurate or</p> <p>24 reliable; is that correct?</p> <p>25 MR. CHACHKES: Objection.</p>

<p>Page 234</p> <p>1 THE WITNESS: I'm not giving 2 any opinion, period, on testing 3 procedures from Johnson & Johnson 4 because I have no knowledge of them 5 and, therefore, cannot comment in any 6 way. 7 QUESTIONS BY MR. FINCH: 8 Q. All right. On page 33 of your 9 report, you reference a term "unspecified 10 constant." 11 Do you see that? 12 A. Yes. 13 MR. CHACHKES: I'm sorry, on 14 page 33? 15 MR. FINCH: Page 33 of her 16 report. 17 THE WITNESS: Yep, it's right 18 here. 19 MR. CHACHKES: Okay. Thanks. 20 QUESTIONS BY MR. FINCH: 21 Q. How do you calculate the camera 22 constant for doing SAED? 23 A. So the camera constant is 24 calibrated for each individual apparatus 25 using a reference standard, and it allows you</p> <p>Page 235</p> <p>1 to relate the spacial distances in an image 2 to actual physical distances. And it varies 3 by instrument, and it is explicitly not 4 provided. Even though the definition of 5 camera constant is given on each page in the 6 diffraction verification document, the actual 7 value for their instrument or instruments is 8 not given. 9 Q. Could you turn to page 37? 10 A. (Witness complies.) 11 Q. What does camera K refer to? 12 A. I have no idea. 13 Q. You don't think that refers to 14 camera constant? 15 A. I was not going to guess. 16 Q. If that, in fact, does -- are 17 you familiar with the scientific -- 18 A. I am, but in point of fact, 19 it's expressed, you'll notice, in units of 20 pixel per angstrom. And the images in these 21 documents, which are many times scanned, no 22 longer have any pixels. 23 So even if that is the camera 24 constant, this number is completely useless 25 because there are no pixels in any of these</p>	<p>Page 236</p> <p>1 images. 2 Q. Isn't it true -- 3 MR. FINCH: Mark this as the 4 next exhibit. It's Exhibit 21. 5 (Dyar Exhibit 21 marked for 6 identification.) 7 QUESTIONS BY MR. FINCH: 8 Q. In the diffraction verification 9 documents -- 10 A. Uh-huh. 11 Q. -- in every one there is a 12 field called camera K, camera K, camera K? 13 A. And in every one it's given in 14 units of pixel per angstrom, which is a 15 useless unit. 16 So I stand by my statement that 17 the constant is unspecified in terms that are 18 useful enough to allow someone else to 19 interpret the images, which was the point of 20 my statement there. 21 Q. Okay. So you're saying that -- 22 did you understand camera K to be a reference 23 to camera constant or not? 24 A. I did not know. There was not 25 enough information. That is not defined</p> <p>Page 237</p> <p>1 anywhere in any of the documents I saw. 2 And even if it had been, I have 3 no way of using that information because 4 there's no pixels in any of the images. 5 Q. The pixels in the images are 6 the SAED images that you've shown some 7 examples of, for example, on page 28 of your 8 report; is that right? 9 A. Certainly. 10 Q. And your -- my understanding is 11 it's your complaint that because the images 12 are not sufficiently clear, you can't verify 13 the camera constant in the diffraction 14 verification worksheets? 15 A. Yes. Using something that's 16 expressed in pixels per angstrom implies that 17 in order to use it, you would need to be able 18 to count pixels, and that is impossible in 19 these images. 20 Q. Was it impossible for the 21 operator at the time he or she was analyzing 22 the particle in realtime using the 23 microscope? 24 A. Presumably the personnel at the 25 Longo, Rigler company are familiar with the</p>
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<p>1 camera constants for their apparati, yes. 2 And in fact, they used said 3 camera constants to determine these values 4 that are at the bottom of each of these 5 pages. But I cannot go backwards. 6 Q. So you can't reverse-engineer 7 it, in other words, and that's your 8 criticism? 9 A. Correct. These documents do 10 not provide a camera constant in any useful 11 units, thereby making it impossible to 12 corroborate their measurements. 13 Q. Okay. But in fact they did 14 have a camera constant. You just -- your 15 criticism is that the pixels are not 16 sufficiently clear for you to recalculate 17 their camera constant for each of the 18 diffraction patterns that they were providing 19 data for; is that correct? 20 MR. CHACHKES: Objection. 21 MR. LOCKE: Objection. 22 THE WITNESS: The point of my 23 statement on page 33 is "lacking 24 knowledge of that constant, D spacings 25 cannot be easily verified for the</p>	<p>1 Rigler failed to demonstrate that 2 their D spacings are reproducible or 3 verifiable independently. 4 QUESTIONS BY MR. FINCH: 5 Q. Do you agree that the 6 anthophyllite solid solution series includes 7 cummingtonite? 8 A. So I don't believe that that 9 vocabulary is consistent with the current 10 terminology for amphiboles. 11 If you look on page 607 of my 12 book, you can see that there are about seven 13 minerals which are in the same subgroup of 14 amphibole minerals. And one could say that 15 there might potentially be solid solution 16 amongst all seven of those primary minerals, 17 each of which has from four to seven related 18 species and many subspecies. 19 So it's a little restrictive to 20 say that those belong to a single solid 21 solution series. It's not really the 22 appropriate term to use for the variation of 23 chemistry in amphibole minerals. 24 Q. On page 35 you state, last 25 paragraph, "A more comprehensive analysis</p>
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<p>1 patterns in their reports." 2 And the most important part of 3 that sentence is that there is not 4 enough information here or in any of 5 these diffraction verification 6 documents for me to confirm the D 7 spacing values that they list. 8 QUESTIONS BY MR. FINCH: 9 Q. But you would agree with me 10 that on the face of each of the documents 11 there is a notation that has camera K, which 12 a scientist could conclude or should conclude 13 means camera constant for that particular 14 data set, correct? 15 MR. LOCKE: Objection. 16 MR. CHACHKES: Objection. 17 THE WITNESS: That's completely 18 conjectural. I have no reason to 19 expect that. K is not the first 20 letter of the word "constant." 21 So lacking any information to 22 tell me that that's what it was, and 23 lacking any way to use that value 24 because of the way it's expressed in 25 units, I feel that Drs. Longo and</p>	<p>1 using the American mineralogists crystal 2 structure database shows that more than 1,000 3 crystal structures have at least one D 4 spacing in the range above." 5 How many of those 1,000 crystal 6 structures have been found in the Vermont 7 talc mines or the Italian talc mines used by 8 Johnson & Johnson? 9 A. I have no idea, because I know 10 nothing about the mineralogy of talc mines in 11 Vermont or anywhere else. 12 Q. On page 37, section F, you 13 identify indefensible or unfeasible D 14 spacings in the Longo and Rigler diffraction 15 verification documents. 16 It looks to me like you 17 identify two samples where either the 18 measurement itself is bad or they cannot be 19 anthophyllite or both; is that correct? 20 A. That's correct. 21 Q. Out of how many different 22 samples? 23 A. I'd have to look at the 24 diffraction verification documents. I don't 25 recall exactly how many samples they did. I</p>

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<p>1 know it was six samples. 2 Q. But it was how many different 3 particles identified? 4 A. I honestly don't recall. We 5 can certainly look it up. 6 Q. Would you agree that it's over 7 180? 8 A. I honestly don't recall, but 9 I'd be happy to look it up if you -- 10 Q. Okay. Go ahead and look it up. 11 A. Well, let's get out those 12 diffraction verification documents. 13 MR. CHACHKES: I'm not 14 trying -- 15 THE WITNESS: Are they not -- 16 MR. FROST: They're 5,000 17 pages. 18 THE WITNESS: No, no, he's just 19 talking about the diffraction 20 verification documents. These are the 21 only places where there are any HKL 22 measurements. 23 QUESTIONS BY MR. FINCH: 24 Q. Do you have your materials that 25 you reviewed of Dr. Longo's with you?</p>	<p>1 on at least two zone axes is relying on 2 Yamate 3 methodology, correct? 3 MR. CHACHKES: Objection. 4 THE WITNESS: It's supported by 5 the Yamate 3 -- or the Yamate 6 recommendation, but it's common sense 7 to anyone who knows anything about 8 crystallography. 9 And I can explain it as saying 10 that minerals are three-dimensional 11 structures, and so if you only look at 12 it from one angle, you would know 13 nothing about the third dimension and, 14 therefore, your identification is 15 nonunique. 16 QUESTIONS BY MR. FINCH: 17 Q. But if the analyst is tilting 18 the goniometer to look at the structure while 19 he's examining it under the electron 20 microscope, isn't it true that he is making a 21 determination in realtime as to whether or 22 not the crystalline structure is or is not 23 consistent with asbestos? 24 A. According to Dr. Longo's and 25 Rigler's depositions, that's what they're</p>
Page 243	Page 245
<p>1 MR. CHACHKES: We may. At some 2 point maybe after the break I could 3 check. 4 MR. FINCH: All right. We'll 5 check that after the break. 6 THE WITNESS: There are 7 certainly less than 200. 8 QUESTIONS BY MR. FINCH: 9 Q. Okay. But 180, we can -- I 10 mean, it's a number we could look up, but -- 11 A. I know for a fact it's only six 12 different samples. In one case there are 13 four different crystals -- or particles, and 14 I don't recall for the other five samples how 15 many particles they looked at. 16 In some senses it doesn't 17 matter how many particles they looked at, 18 because there is in -- no evidence in any of 19 those diffraction verification documents that 20 they looked at two different zone axes. So 21 my conclusions here about the vast number of 22 samples that they can represent stand. 23 Q. And your opinion that in order 24 to test a material for asbestos using EPA 25 methodology you have to have a confirmation</p>	<p>1 doing. They're looking at the screen and 2 making a decision. They're not actually 3 using zone axes. That is what his deposition 4 states. 5 I give that -- citations to 6 that as footnotes in here, 53, 54 and 55. 7 Q. Okay. Let's go to page 24 of 8 the report. 9 A. Uh-huh. 10 Q. All right. You have on page -- 11 pages 24 through 26 an analysis of the six 12 different analysts in -- working with or for 13 Dr. Longo as to the percentages -- on 14 page 25, the percentages that identify 15 tremolite versus anthophyllite. 16 On page 26, you've got a graph 17 of mineral species identification from 18 Vermont, and then at the bottom of page 26 19 you have a time chart that shows tremolite 20 versus anthophyllite over time. 21 That's Figures 8, 9 and 10 in 22 your report. 23 A. Yes, and these data were simply 24 taken from the information in Dr. Longo's 25 reports.</p>

<p style="text-align: right;">Page 246</p> <p>1 Q. Okay.</p> <p>2 A. As seen in the spreadsheets</p> <p>3 with which we have provided you.</p> <p>4 Q. Right, the backup data that you</p> <p>5 gave us last night.</p> <p>6 Let me ask you this --</p> <p>7 MR. CHACHKES: Just to be</p> <p>8 clear, that's Longo's data. You know</p> <p>9 that, right?</p> <p>10 MR. FINCH: I understand that.</p> <p>11 MR. CHACHKES: Okay.</p> <p>12 MR. FINCH: It's her analysis</p> <p>13 of Longo's data.</p> <p>14 MR. CHACHKES: No, it's Longo's</p> <p>15 data.</p> <p>16 THE WITNESS: Yes. There's no</p> <p>17 analysis involved here. This is just</p> <p>18 a graphical representation of the data</p> <p>19 that are given by Dr. Longo.</p> <p>20 MR. FINCH: Okay. All right.</p> <p>21 THE WITNESS: That does not</p> <p>22 involve analysis.</p> <p>23 QUESTIONS BY MR. FINCH:</p> <p>24 Q. You say that "data in the</p> <p>25 Longo, Rigler MAS reports indicates that</p>	<p style="text-align: right;">Page 248</p> <p>1 samples in these reports were assigned at</p> <p>2 random, and therefore, given his assertion,</p> <p>3 it seems highly unlikely that this</p> <p>4 distribution over time would be seen.</p> <p>5 Q. Well, if the material that he</p> <p>6 had to test through the end of 2017 consisted</p> <p>7 of three bottles of Vermont-sourced talc and</p> <p>8 the rest from other parts of the world,</p> <p>9 either Italy or China, and the analysis done</p> <p>10 in 2018 where the samples -- the majority of</p> <p>11 which came from Vermont-sourced talc,</p> <p>12 wouldn't you expect to see -- or isn't it</p> <p>13 possible you could have a difference in the</p> <p>14 percentage of tremolite versus the percentage</p> <p>15 of anthophyllite just based on the source</p> <p>16 mine from which the material came?</p> <p>17 MR. LOCKE: Objection.</p> <p>18 MR. CHACHKES: Objection.</p> <p>19 THE WITNESS: If, in fact,</p> <p>20 Dr. Longo had stated something to that</p> <p>21 effect in his deposition, that might</p> <p>22 be a possible conclusion.</p> <p>23 But the fact is that Dr. Longo</p> <p>24 says that these samples were assigned</p> <p>25 at random and, therefore, I have no</p>
<p style="text-align: right;">Page 247</p> <p>1 samples mined from Vermont appear to have</p> <p>2 75 percent anthophyllite and 25 percent</p> <p>3 tremolite."</p> <p>4 What's the basis of that</p> <p>5 statement?</p> <p>6 A. The data that are in the</p> <p>7 spreadsheet that you were provided with.</p> <p>8 Calculations are shown there.</p> <p>9 Q. In Figure 10, there are reports</p> <p>10 done in 2017 -- first of all, what are the --</p> <p>11 what are the dates on the bottom row of</p> <p>12 Figure 10?</p> <p>13 A. So those are months.</p> <p>14 Q. Yes.</p> <p>15 A. And they refer to the stated</p> <p>16 date of analyses that are given on the third</p> <p>17 page of the TEM reports in all of Dr. Longo's</p> <p>18 reports.</p> <p>19 Q. Would you agree with me that</p> <p>20 the percentage of tremolite versus the</p> <p>21 percentage of anthophyllite found in the</p> <p>22 samples analyzed could depend on the source</p> <p>23 mine from which it came?</p> <p>24 A. Possibly, yes. But in</p> <p>25 deposition, Dr. Longo stated that all of the</p>	<p style="text-align: right;">Page 249</p> <p>1 reason to expect or suspect that any</p> <p>2 particular mine was sourced and</p> <p>3 provided the analyses at random in</p> <p>4 this particular time frame.</p> <p>5 QUESTIONS BY MR. FINCH:</p> <p>6 Q. Isn't it true that in MDL</p> <p>7 reports he lists out the -- do you know when</p> <p>8 Dr. Longo received the MDL samples?</p> <p>9 A. I'm sure that's buried in the</p> <p>10 chain of custody documents, but I didn't pay</p> <p>11 much attention to those because when he</p> <p>12 received them was not relevant to my mandate</p> <p>13 of assessing the methodology used.</p> <p>14 Q. If five analysts are provided</p> <p>15 with a total of 32 samples, 29 from an</p> <p>16 Italian mine, 3 from a Vermont mine, and</p> <p>17 they're randomly distributed in 2017, isn't</p> <p>18 it the case that you could have a</p> <p>19 distribution pattern very similar to</p> <p>20 Figure 10 if those analysts were provided</p> <p>21 with many, many more samples from Vermont in</p> <p>22 2018, and it was randomly distributed along</p> <p>23 the five -- the same five people? That is</p> <p>24 one explanation for this time dichotomy you</p> <p>25 show in Figure 10, correct?</p>

<p style="text-align: right;">Page 250</p> <p>1 MR. FROST: Objection.</p> <p>2 THE WITNESS: Boy, that's a lot</p> <p>3 of hypotheticals there.</p> <p>4 I'd have to sit down and look</p> <p>5 at the math and review my data, which</p> <p>6 are not -- which were provided to you</p> <p>7 but not included in this report, that</p> <p>8 suggests that there's a 75 percent to</p> <p>9 25 percent of anthophyllite to</p> <p>10 tremolite.</p> <p>11 So, for example, in your case,</p> <p>12 you're saying that in 2017 perhaps</p> <p>13 those samples were all from Vermont.</p> <p>14 Yet if they were from Vermont, then we</p> <p>15 should have seen a lot more</p> <p>16 anthophyllite, 75 percent more to be</p> <p>17 precise.</p> <p>18 So I'm not sure where you're</p> <p>19 going with that question.</p> <p>20 QUESTIONS BY MR. FINCH:</p> <p>21 Q. No, you've got it backwards.</p> <p>22 If virtually all the samples in</p> <p>23 2017 up through March of 2018 came --</p> <p>24 A. Are tremolite.</p> <p>25 Q. -- from sources other than</p>	<p style="text-align: right;">Page 252</p> <p>1 that you're bending your assertions to</p> <p>2 match the graph. And I'd rather know</p> <p>3 the facts on what the distributions of</p> <p>4 species are in these other deposits,</p> <p>5 which I don't, in order to support or</p> <p>6 negate your hypothesis.</p> <p>7 QUESTIONS BY MR. FINCH:</p> <p>8 Q. Okay. Isn't it true that you</p> <p>9 don't know the distribution of tremolite</p> <p>10 versus anthophyllite in the samples from</p> <p>11 outside of Vermont that Dr. Longo's</p> <p>12 laboratory tested? Correct?</p> <p>13 MR. CHACHKES: Objection.</p> <p>14 THE WITNESS: That is correct.</p> <p>15 All I know is that Dr. Longo stated</p> <p>16 that the selection and assignment of</p> <p>17 samples in this study was random.</p> <p>18 And, therefore, I have no reason to</p> <p>19 believe your conjecture that there was</p> <p>20 a bias in geographical assignment of</p> <p>21 these samples over time, because</p> <p>22 Dr. Longo himself said that there was</p> <p>23 not. He said that they were assigned</p> <p>24 at random.</p> <p>25</p>
<p style="text-align: right;">Page 251</p> <p>1 Vermont --</p> <p>2 A. Ah.</p> <p>3 Q. -- you would expect to see a</p> <p>4 lot more tremolite than anthophyllite,</p> <p>5 correct?</p> <p>6 MR. LOCKE: Objection.</p> <p>7 THE WITNESS: That's not true,</p> <p>8 because I actually don't know what the</p> <p>9 percentage of anthophyllite to</p> <p>10 tremolite is in the other mines. I</p> <p>11 only have -- happen to know it for</p> <p>12 Vermont.</p> <p>13 QUESTIONS BY MR. FINCH:</p> <p>14 Q. If, in fact, it's 100 percent</p> <p>15 tremolite and zero percent anthophyllite in</p> <p>16 the other mines, wouldn't the graphic</p> <p>17 Figure 10 look exactly the same?</p> <p>18 You'd see a lot more tremolite</p> <p>19 in the samples that Dr. Longo was able to</p> <p>20 test prior to March of 2017 where the mines</p> <p>21 were predominantly Italy, sources</p> <p>22 predominantly Italy, versus the MDL samples</p> <p>23 where the source was predominantly Vermont?</p> <p>24 MR. FROST: Objection.</p> <p>25 THE WITNESS: It seems to me</p>	<p style="text-align: right;">Page 253</p> <p>1 QUESTIONS BY MR. FINCH:</p> <p>2 Q. He said they were assigned at</p> <p>3 random. He was not asked what percentage of</p> <p>4 the -- isn't it fair to conclude that it was</p> <p>5 random for the samples that he had at the</p> <p>6 time they were being tested, and he didn't go</p> <p>7 back and randomly assign all the samples to</p> <p>8 his analysts after he got all the MDL</p> <p>9 samples?</p> <p>10 MR. CHACHKES: Objection.</p> <p>11 THE WITNESS: You know, there's</p> <p>12 not enough information to be able to</p> <p>13 answer that question.</p> <p>14 I did not compile the</p> <p>15 information on when specific samples</p> <p>16 were obtained, so I can't either</p> <p>17 support or negate your assertion</p> <p>18 without reconsidering the data in the</p> <p>19 report.</p> <p>20 QUESTIONS BY MR. FINCH:</p> <p>21 Q. All right. Would you agree</p> <p>22 with me that Mehrdad Motamedi and Anthony</p> <p>23 Keaton had very consistent findings of</p> <p>24 tremolite versus anthophyllite for the 179</p> <p>25 particles that Motamedi examined and Keaton's</p>

<p style="text-align: right;">Page 254</p> <p>1 289 particles?</p> <p>2 A. Actually, no, I would say it's</p> <p>3 kind of odd that Keaton identified a fair</p> <p>4 number of ferro-anthophyllites and Motamedi</p> <p>5 did not.</p> <p>6 Q. Do you know the source of the</p> <p>7 talc for each of the six analysts -- each of</p> <p>8 the five analysts identified in Figure 8?</p> <p>9 How many -- how many Vermont-sourced talc did</p> <p>10 Jayme Callan analyze versus other places; how</p> <p>11 many Motamedi did; how many Keaton did?</p> <p>12 A. Well, that information is in</p> <p>13 Figure 8.</p> <p>14 Q. How is it in Figure 8? It just</p> <p>15 says what the --</p> <p>16 A. It says where it came from,</p> <p>17 either Vermont or other.</p> <p>18 Q. That's in Figure 9.</p> <p>19 A. I'm sorry, Figure 9.</p> <p>20 Q. What about 8?</p> <p>21 A. No, I didn't happen to figure</p> <p>22 out a way to color code Figure 8 to indicate</p> <p>23 where the samples came from. I could have</p> <p>24 done that, I suppose, but it didn't even</p> <p>25 occur to me to do that.</p>	<p style="text-align: right;">Page 256</p> <p>1 with that 75/25 value for Vermont.</p> <p>2 MR. FINCH: This is probably a</p> <p>3 good place to take another break.</p> <p>4 MR. CHACHKES: Okay.</p> <p>5 VIDEOGRAPHER: The time is</p> <p>6 3:35 p.m. Off the record.</p> <p>7 (Off the record at 3:35 p.m.)</p> <p>8 VIDEOGRAPHER: Okay. All</p> <p>9 right. We are now back on the record.</p> <p>10 The time is 3:54 p.m.</p> <p>11 QUESTIONS BY MR. FINCH:</p> <p>12 Q. We're back on the record after</p> <p>13 a short break.</p> <p>14 Ms. Darby Dyar, do you have</p> <p>15 Exhibit 19 in your pile still?</p> <p>16 A. Yes. Somewhere. Yes.</p> <p>17 Q. Do you consider yourself to be</p> <p>18 an expert in using electron microscopy and</p> <p>19 selected area diffraction to determine the</p> <p>20 extent of amphiboles or serpentine</p> <p>21 contamination in samples of talc?</p> <p>22 A. So, first of all, no one would</p> <p>23 use SAED to determine the extent of</p> <p>24 amphiboles or serpentine contamination</p> <p>25 because you can only do one at a time. So</p>
<p style="text-align: right;">Page 255</p> <p>1 I'm looking at methodology and</p> <p>2 I'm trying to assess whether the analysts who</p> <p>3 did this work were consistent and, therefore,</p> <p>4 I made graphical representations of the data</p> <p>5 in their own reports, but, no, I did not make</p> <p>6 yet another graphical representation that</p> <p>7 would have included both the minerals</p> <p>8 identified and the locations from which they</p> <p>9 came.</p> <p>10 Q. Would you agree with me that</p> <p>11 the breakdown as between tremolite and</p> <p>12 anthophyllite could vary among analysts if</p> <p>13 one of the analysts was reviewing more</p> <p>14 Italian-sourced talc and the other analyst</p> <p>15 was reviewing more Vermont-sourced talc?</p> <p>16 A. I don't have enough information</p> <p>17 to know anything about the ratio of those in</p> <p>18 the other mines. So I can't address that</p> <p>19 question.</p> <p>20 In point of fact, in the</p> <p>21 information that I have gave you, you will</p> <p>22 see that I did not know the mine locations</p> <p>23 for many, many samples, but I did happen to</p> <p>24 know the mine location for Vermont for</p> <p>25 several, so that's how I was able to come up</p>	<p style="text-align: right;">Page 257</p> <p>1 that's sort of a strange question.</p> <p>2 Do I consider myself to be an</p> <p>3 expert in using electron microscopy and SAED</p> <p>4 to identify minerals? Yes.</p> <p>5 Q. Okay. Exhibit 19 is a report</p> <p>6 from McCrone Associates where they say,</p> <p>7 "We've examined two groups of samples using</p> <p>8 electron microscopy and selected area</p> <p>9 diffraction to determine the extent of</p> <p>10 amphiboles or serpentine contamination in</p> <p>11 these two groups of samples."</p> <p>12 And then they describe these as</p> <p>13 talc samples from your orebody, being the</p> <p>14 Windsor Mineral company's orebody.</p> <p>15 "The second grade consisted of</p> <p>16 seven samples which were sent to us</p> <p>17 subsequently to be analyzed separately."</p> <p>18 And then it has their general</p> <p>19 conclusions on pages 2, 3, 4 of the report.</p> <p>20 Do you see that?</p> <p>21 MR. CHACHKES: Objection.</p> <p>22 THE WITNESS: It will take me a</p> <p>23 while to read through these five</p> <p>24 pages, but I certainly see the pages.</p> <p>25</p>

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<p>1 QUESTIONS BY MR. FINCH:</p> <p>2 Q. You were asked by Johnson &</p> <p>3 Johnson to evaluate the methodology that</p> <p>4 Dr. Longo and Rigler followed to analyze</p> <p>5 samples of talc to determine whether there's</p> <p>6 asbestos in them or not, correct?</p> <p>7 That was your charge here?</p> <p>8 A. I was asked to evaluate the</p> <p>9 methodology -- methodology -- methodology of</p> <p>10 Drs. Longo and Rigler, yes, that is why we're</p> <p>11 all here.</p> <p>12 Q. If you were asked by Johnson &</p> <p>13 Johnson to analyze both the methodology and</p> <p>14 the conclusions of Walter McCrone Associates</p> <p>15 in this July 1975 report, what information or</p> <p>16 data or materials would you want to see?</p> <p>17 MR. CHACHKES: Objection.</p> <p>18 THE WITNESS: That's kind of a</p> <p>19 strange hypothetical. Because that's</p> <p>20 not enough information in here for me</p> <p>21 to even evaluate what their</p> <p>22 methodology was.</p> <p>23 QUESTIONS BY MR. FINCH:</p> <p>24 Q. Well, they state that they used</p> <p>25 electron microscopes and selected area</p>	<p>1 agreed with their conclusions?</p> <p>2 A. So in my report I referred to</p> <p>3 in -- particularly the Yamate document which</p> <p>4 we've already discussed on this day that says</p> <p>5 two zone axis measurements and an EDS pattern</p> <p>6 are usually enough to identify an asbestos</p> <p>7 mineral.</p> <p>8 But there's no information in</p> <p>9 the very brief, out-of-context document about</p> <p>10 samples that I don't know where they came</p> <p>11 from or whether these were actually used as</p> <p>12 ore for anything having to do with talcum</p> <p>13 powder. I don't know.</p> <p>14 Q. All right. Would you -- one of</p> <p>15 the things, I assume, that you would want to</p> <p>16 look at would be the EDS, EDXA printouts of</p> <p>17 their electron microscopes if they used EDS,</p> <p>18 EDXA to analyze the chemical composition of</p> <p>19 the structures they were looking at.</p> <p>20 Is that one item of data you</p> <p>21 would want to see to evaluate their</p> <p>22 methodology in coming to this report for</p> <p>23 Windsor Mineral?</p> <p>24 MR. CHACHKES: Objection.</p> <p>25 THE WITNESS: So, again, this</p>
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<p>1 diffraction to determine the extent of</p> <p>2 amphiboles or serpentine contamination of two</p> <p>3 groups of talc samples.</p> <p>4 So they describe, at least</p> <p>5 generally, the tools and methodology they are</p> <p>6 using in their July 1975 report, correct?</p> <p>7 MR. CHACHKES: Objection.</p> <p>8 THE WITNESS: I don't know. I</p> <p>9 would have to look at this more</p> <p>10 carefully than just this brief</p> <p>11 inspection, but, for example, if they</p> <p>12 used SAED, did they do two different</p> <p>13 zone axes? I don't know. Perhaps if</p> <p>14 I read -- had the time to sit down and</p> <p>15 read this, I might find that out.</p> <p>16 But all they say is electron</p> <p>17 microscopy. I don't know what that</p> <p>18 means. Does that mean SAED using an</p> <p>19 electron microscope, or does that mean</p> <p>20 they did something else other than</p> <p>21 SAED? Unclear.</p> <p>22 QUESTIONS BY MR. FINCH:</p> <p>23 Q. Okay. What information would</p> <p>24 you want to see in order to evaluate what</p> <p>25 they did and whether -- or whether or not you</p>	<p>1 is kind of an extreme hypothetical. I</p> <p>2 return to the Yamate paper which says</p> <p>3 that to identify asbestos you need two</p> <p>4 SAED patterns and some EDS</p> <p>5 information.</p> <p>6 QUESTIONS BY MR. FINCH:</p> <p>7 Q. Okay. So we'd want to see SAED</p> <p>8 patterns, which are taken at least two</p> <p>9 different zone axes, correct?</p> <p>10 A. Correct.</p> <p>11 Q. You'd want to see EDS</p> <p>12 information, correct?</p> <p>13 A. That's what I just said, yes.</p> <p>14 Q. Would you want to see</p> <p>15 photomicrographs of the structures they were</p> <p>16 examining under the microscope to see what</p> <p>17 you could learn about their morphology or</p> <p>18 aspect ratio?</p> <p>19 MR. CHACHKES: Objection.</p> <p>20 THE WITNESS: All of that</p> <p>21 depends on what the goal of the</p> <p>22 testing is.</p> <p>23 This testing says they found</p> <p>24 amphiboles, but it doesn't -- but</p> <p>25 there's no information here that would</p>

<p style="text-align: right;">Page 262</p> <p>1 suggest that they are asbestiform 2 amphiboles. 3 And in fact, you'd think that 4 if it's such a rare thing that they 5 would actually note if it was 6 asbestiform, and it's not noted as 7 such in here. 8 QUESTIONS BY MR. FINCH: 9 Q. Doesn't it say in Table 1 and 10 Table 2 confirmed asbestos visual and then 11 description of sample content of sediment, 12 asbestos? 13 A. It gives the word "visual," 14 which does not instill in me a lot of 15 confidence that it's actually either. Visual 16 of what? Visual of the SAED pattern? Visual 17 of the image they were looking at down the 18 electron microscope. 19 There's -- one wonders if 20 there's more to this document and what the 21 context is, and whether these samples were 22 even used in talcum powder. Can't tell any 23 of that from here. 24 I don't know what the word 25 "low" means, for example.</p>	<p style="text-align: right;">Page 264</p> <p>1 THE WITNESS: I'm not exactly 2 sure how this question is appropriate 3 to my mandate, which was to evaluate 4 the methodology used by someone else. 5 I have not yet been asked to 6 devise my own methodology, and so it's 7 hard for me to make a definitive 8 statement of that. 9 In my report I say that 10 Drs. Longo and Rigler should have 11 followed the Yamate recommendation of 12 two zone axes and an EDS pattern, and 13 I also say that the Su method, which 14 uses PLM, is useful in identifying 15 asbestos. 16 So if I were going to design my 17 own protocol, in vague terms, it would 18 be some combination of those, but 19 that's all I could say without further 20 study. 21 QUESTIONS BY MR. FINCH: 22 Q. Am I correct that you have 23 never designed a protocol for testing talc to 24 determine whether or not it has asbestos 25 fibers in it?</p>
<p style="text-align: right;">Page 263</p> <p>1 Q. Well, would you want to see 2 their count sheets, for example? 3 MR. CHACHKES: Objection. 4 QUESTIONS BY MR. FINCH: 5 Q. To evaluate their methodology 6 and conclusions? 7 MR. CHACHKES: Objection. 8 THE WITNESS: I find this 9 question kind of too hypothetical. If 10 they existed, I would want all the 11 information that they had available. 12 But in particular, I would want the 13 SAED zone axis information and the EDS 14 quantitative information to the extent 15 that that was available in 1975. 16 QUESTIONS BY MR. FINCH: 17 Q. I want you to assume that you 18 are provided with a hundred samples of talc 19 by Johnson & Johnson and asked to evaluate it 20 for the purpose of determining whether or not 21 it contains asbestiform asbestos fibers. 22 What methodology would you use, 23 what would you do step by step to analyze 24 each particular talc sample? 25 MR. FROST: Objection.</p>	<p style="text-align: right;">Page 265</p> <p>1 A. I've designed many, many 2 analytical protocols for a wide range of 3 instrumentation, but it is correct to say 4 that I have never devised a protocol for 5 analyzing asbestos in anything. 6 Q. Okay. And is it correct to say 7 that you have never in your professional work 8 relied on the published protocol that are out 9 there for analyzing the presence of asbestos 10 in anything? 11 A. In my research, I have 12 consistently relied on these tools for the 13 identification of a wide range of minerals. 14 What was your question? 15 But I have never had the need 16 in my professional work to rely on any 17 published protocol for analyzing the presence 18 of asbestos. 19 Q. Okay. Do you draw a 20 distinction in your mind between the tools 21 that a scientist uses to determine the nature 22 of a mineral and the protocol that a 23 scientist follows to determine the nature of 24 a mineral? 25 A. Well, the tools are just the</p>

<p style="text-align: right;">Page 266</p> <p>1 pencils of a -- of a mineralogist, if you 2 will, and the protocol is that you're trained 3 to use the pencils. 4 So I don't really understand 5 the question. 6 Q. Okay. Well, the tools -- would 7 you agree with me that one tool that is 8 useful to determine whether or not there is 9 asbestos in a mineral is a polarized light 10 microscope? 11 A. Yes. 12 Q. Would you agree with me that 13 another tool that is useful to determine 14 whether or not there is asbestos in a mineral 15 is a transmission electron microscope? 16 A. Yes. 17 Q. Would you agree with me that 18 another tool that is useful to determine 19 whether or not there's asbestos in a mineral 20 is a scanning electron microscope? 21 A. Yes. 22 Q. Do you view SAED as a tool or a 23 protocol? 24 A. I view it as a technique. 25 Q. Okay. Do you agree that SAED</p>	<p style="text-align: right;">Page 268</p> <p>1 mineral if it is used in conjunction with 2 other techniques? 3 A. Asbestos in a mineral? I'm not 4 sure what you mean by that. 5 Q. Asbestos in talc. 6 A. No, strictly speaking I'm going 7 to reverse my previous answer. 8 SAED can't tell you whether 9 asbestos is present because SAED cannot tell 10 you the -- anything about the morphology of 11 the particle. SAED can only tell you what 12 the crystal structure is. 13 Q. Again, my question is not 14 whether SAED by itself can tell you 15 definitively whether a particle is asbestos 16 or not. 17 My question is: Is SAED a 18 useful technique that a scientist should 19 follow if they're analyzing a sample of talc 20 and they want to determine whether or not 21 there is asbestos in it or not? 22 A. SAED is useful for answering 23 that question, yes. 24 Q. Is EDS, EDXA useful for 25 answering the question and analyzing a sample</p>
<p style="text-align: right;">Page 267</p> <p>1 is a useful technique for determining the 2 presence of asbestos in a mineral? 3 A. No, because as with all the 4 previous questions, some of these techniques 5 only tell you which mineral species is 6 present. 7 So in order to determine 8 whether something is asbestos, of course, 9 part of the answer is understanding the 10 chemistry, part of the answer is 11 understanding the crystal chemistry, and part 12 of the answer is evaluating mineralogy -- 13 sorry, morphology. 14 So each of these techniques 15 that we've just discussed here treat a 16 different aspect of the definition of 17 asbestos that's given in my report. 18 Q. Okay. And I didn't ask you 19 whether or not SAED is sufficient by 20 itself -- is technique that's sufficient by 21 itself for determining the presence of 22 asbestos in a mineral. 23 I'm asking whether using the 24 technique of SAED is a useful technique for 25 determining the presence of asbestos in a</p>	<p style="text-align: right;">Page 269</p> <p>1 of talc to determine whether or not there's 2 asbestos in it? 3 A. Again, let's be absolutely 4 clear here. EDS only tells you something 5 about the composition, but knowing something 6 about the composition may, in fact, inform 7 the question of whether or not there is one 8 of the six regulated asbestos mineral species 9 present, yes. 10 Q. In order for a scientist to 11 conclude that there is asbestos present in 12 talc, is it your view that he or she should 13 test the sample using EDXA with two zone 14 axes -- excuse me, using EDXA, full stop, 15 SAED with two zone axes, PLM and doing a 16 statistical test on the aspect ratios if 17 there's enough fibers to look at to analyze 18 that? 19 A. If it's -- if it's all done 20 properly, yes. 21 Q. Okay. So the four techniques 22 to determine whether or not talc contains 23 asbestos are EDXA, SAED, PLM, and some kind 24 of statistical test on the aspect ratios to 25 determine whether it's asbestiform or</p>

<p style="text-align: right;">Page 270</p> <p>1 non-asbestiform; is that correct?</p> <p>2 A. It doesn't necessarily have to</p> <p>3 be the aspect ratios, but some kind of</p> <p>4 statistical test on the measurements of the</p> <p>5 particle sizes -- size dimensions, yes.</p> <p>6 Q. Any other technique that you</p> <p>7 regard as necessary to determine whether or</p> <p>8 not talc contains asbestos?</p> <p>9 MR. FROST: Objection. Form.</p> <p>10 THE WITNESS: I think that</p> <p>11 combination of techniques, if done</p> <p>12 properly, which Drs. Longo and Rigler</p> <p>13 don't seem to know how to do, would be</p> <p>14 sufficient to identify impurities that</p> <p>15 occur in talc as being one of the six</p> <p>16 regulated asbestos mineral species,</p> <p>17 yes.</p> <p>18 But only if they're done</p> <p>19 properly. And, of course, my report</p> <p>20 details the many problems with the way</p> <p>21 they were done by Drs. Longo and</p> <p>22 Rigler.</p> <p>23 QUESTIONS BY MR. FINCH:</p> <p>24 Q. Does PLM allow you to</p> <p>25 positively identify asbestos fibers?</p>	<p style="text-align: right;">Page 272</p> <p>1 that there's ten instances where the Longo,</p> <p>2 Rigler reports identify concentrations of</p> <p>3 asbestos by the Blount PLM method that are</p> <p>4 well above the sensitivity limits ISO PLM.</p> <p>5 What do you mean by that?</p> <p>6 A. So those are given in the table</p> <p>7 at the top of page 47.</p> <p>8 So in other words, there's an</p> <p>9 inconsistency here because the Blount PLM</p> <p>10 test, which is supposedly more sensitive than</p> <p>11 the ISO PLM test, registers no asbestos. So</p> <p>12 it's quite an inconsistency here that the</p> <p>13 other technique is finding unusual and</p> <p>14 unreproducible amounts.</p> <p>15 Q. You're talking about the table</p> <p>16 at the top of 47?</p> <p>17 A. Correct.</p> <p>18 Where I'm contrasting the</p> <p>19 Longo, Rigler PLM results with the ones from</p> <p>20 J3.</p> <p>21 Q. Okay. Do you know how much</p> <p>22 time the analysts at J3 spent to analyze each</p> <p>23 sample under PLM versus how much time the</p> <p>24 analysts in Longo's labs spent to analyze the</p> <p>25 samples using PLM?</p>
<p style="text-align: right;">Page 271</p> <p>1 A. If done correctly, it may.</p> <p>2 So here's the problem,</p> <p>3 polarized light microscopy relies on two</p> <p>4 different kinds of information: One</p> <p>5 information is about the dimension of the</p> <p>6 particle and if the particle is bigger than</p> <p>7 about 2.5 microns, it can be seen with PLM.</p> <p>8 So that's one thing.</p> <p>9 And then the other thing is PLM</p> <p>10 relies on refractive index, and generally</p> <p>11 speaking you look at it in two directions.</p> <p>12 So assuming that the particle was big enough</p> <p>13 to see and assuming that the correct series</p> <p>14 of refractive index measurements were made as</p> <p>15 represented by Su who says use 10 to 20</p> <p>16 different refractive index oils and look at</p> <p>17 many different grains, if all of that was</p> <p>18 done properly, then, yes, PLM can potentially</p> <p>19 be used to identify asbestos minerals.</p> <p>20 So, again, it's if done</p> <p>21 properly. And, of course, as I said, if the</p> <p>22 dimensions of the grain are such that they</p> <p>23 can be seen under polarized light -- under</p> <p>24 PLM.</p> <p>25 Q. All right. On page 46 you said</p>	<p style="text-align: right;">Page 273</p> <p>1 A. I have no information on that.</p> <p>2 I don't believe that's stated anywhere in the</p> <p>3 reports.</p> <p>4 Q. Do you have an understanding of</p> <p>5 what is the typical time an analyst would</p> <p>6 spend to identify by PLM asbestos in an</p> <p>7 asbestos-containing bulk material where you</p> <p>8 believe it's likely to be there?</p> <p>9 A. So in other words, if you</p> <p>10 handed me a sample of salt, told me it was</p> <p>11 salt, and then asked me to identify it under</p> <p>12 a polarized light microscope, how long would</p> <p>13 it take me? Not very long.</p> <p>14 Q. 10 to 15 minutes?</p> <p>15 A. Maybe.</p> <p>16 Q. Do you have any understanding</p> <p>17 as to how much material Dr. Longo's lab</p> <p>18 analyzed using the Blount PLM method as</p> <p>19 compared to J3 Resources as reflected in the</p> <p>20 table at the top of page 47?</p> <p>21 A. I don't recall that</p> <p>22 information. I don't recall if it was in the</p> <p>23 report. I wasn't paying attention to how</p> <p>24 much material was there because it's really</p> <p>25 irrelevant. In PLM you're looking at a very</p>

<p style="text-align: right;">Page 274</p> <p>1 small area, and so how much material he had 2 to start out with is completely irrelevant. 3 It's what ended up on the slide and being 4 inspected by PLM that would be relevant. 5 Q. In your Longo, Rigler, Blount 6 PLM weight percentage, what's the denominator 7 that you're using for that? 8 Is that the material after it's 9 been spun out using the Blount method or is 10 that before? 11 A. Those are just the results in 12 the report. I don't recall. Those are your 13 numbers. I just tabulated them and put them 14 in my report. I don't recall. 15 Q. Do you know what an 16 aberrational corrective lens is for a 17 polarized light microscope? 18 A. Yes. 19 Q. Can you explain that? 20 A. There's different kinds of 21 aberration corrections. It's basically a 22 piece of glass with optical properties that 23 change the appearance of the image that you 24 see under the microscope. 25 Q. Could the fact that one</p>	<p style="text-align: right;">Page 276</p> <p>1 laboratory spent 15 minutes looking at each 2 sample by PLM to determine if they found 3 anything that was indicative of an asbestos 4 fiber and the other laboratory spent two 5 hours per sample, could the time spent affect 6 what is found? 7 A. You know, as a scientist, I 8 don't think in terms of how long a task 9 takes. I think in terms of trying to get the 10 right answer. 11 So as a scientist, it didn't 12 even occur to me to look at these reports and 13 ask how long something took. I assumed that 14 they took enough time to get the answers that 15 they did. 16 Q. Would you agree with me just 17 generally, if you're looking for minute 18 amounts of material in a substance, the more 19 time you spend looking for it, if it's there, 20 the higher likelihood that you are to find it 21 than as compared to the less time you spend 22 looking for it? 23 A. So if you hide a needle in a 24 haystack and you search for ten minutes, 25 you're probably not going to find the needle,</p>
<p style="text-align: right;">Page 275</p> <p>1 laboratory used an aberrational corrective 2 lens versus a standard lens affect the 3 ability to detect asbestos in a sample of 4 talc? 5 A. Well, it would depend on what 6 kind of aberrational microscope it was, and 7 it would also depend on how the analysis was 8 done. 9 So not necessarily, I guess, 10 would be my answer to that. 11 Q. But it could? 12 A. It could or it could not, 13 depending on exactly which kind of correction 14 lens you were using. 15 If you're talking about the 16 lens using {sic} in dispersion staining, 17 that's not necessarily a more accurate method 18 than using a succession of refractive index 19 oils. 20 Q. Could the amount of time spent 21 looking through the sample to determine 22 whether or not there was any asbestos 23 detected affect the results of one laboratory 24 versus another? 25 By that mean I mean if one</p>	<p style="text-align: right;">Page 277</p> <p>1 and if you searched for two days, you might 2 not find the needle. So it kind of depends 3 on the abundance of the impurity that you're 4 looking for. 5 Q. But do you think -- 6 A. In that case, the difference 7 between two days and ten minutes is not 8 significant. 9 Q. Have you ever done any analysis 10 to determine whether the difference between 11 two hours of looking at talc with a PLM will 12 make a material difference as compared to 13 looking at it for 15 minutes on a per-sample 14 basis? 15 A. You know, I teach optical 16 mineralogy, or have taught frequently. Some 17 students can identify a mineral really fast; 18 some students take a long time. Both of them 19 will get to the right answer eventually. 20 So as I said, as a scientist, I 21 never think in terms of the time it takes. I 22 just think about how good the -- about what 23 is necessary to obtain the result needed. 24 Time is not a thing that's usually relevant 25 to me.</p>

<p>Page 278</p> <p>1 Q. Am I correct that you did not 2 make any analysis of the time the analysts 3 spent with PLM on the samples in the J3 lab 4 versus the Longo lab? 5 A. That's correct, and the reason 6 would be that I do not consider time to be 7 relevant to how good their methodology was. 8 Q. All right. On page 49 you 9 have -- an example of a confusing PLM image 10 is given in Figure 21. 11 A. Correct. 12 Q. Am I correct that Figure 21 is 13 a printout of an image that's in the backup 14 materials to Dr. Longo's report? 15 A. It is one of his dispersion 16 staining images, yes. 17 Q. Okay. You say, "The view at 18 left is pink because it is a dispersion 19 staining image, which is a special way a 20 plate is inserted in the microscope to make 21 the colors more intense and more diagnostic." 22 A. In layman's terms, yes, that's 23 what I say. 24 Q. Why do you conclude that it's a 25 dispersion staining image?</p>	<p>Page 280</p> <p>1 your report; is that correct? 2 A. I'd have to look, but -- well, 3 actually, I don't think this is Figure 12. 4 Are we looking at the first 5 one? 6 This is not Image 21. 7 Q. Page 49 of your report. 8 Look at page 49 of your report. 9 A. Oh, yes -- oh, right, but not 10 this. Okay. Yes. 11 Q. Okay. Page 49 of your report 12 has -- in the bottom it has a sample number? 13 A. Yep. 14 Q. Okay. And what is the sample 15 number? 16 A. Well, it's too small for me to 17 read. 18 Q. Okay. I can read it. It says, 19 "M69680-015BL-003, anthophyllite elongation 20 at 400 times." 21 A. Okay. Thank you. 22 Q. All right. Section 13 is -- 23 let's go through it page by page. 24 First of all, it lists the 25 project split number M69680-015BL, correct?</p>
<p>Page 279</p> <p>1 A. Because the background color is 2 pink, and the action of the dispersion lens 3 is usually to increase the colors that are 4 viewed. 5 Q. Do you know what an elongation 6 image is? 7 A. Yes. 8 Q. What is an elongation image? 9 A. An elongation image is when you 10 use -- you rotate the microscope to get 11 the -- the image to coincide with the maximum 12 extent of reflective index. 13 Q. And can an elongation image be 14 done without dispersion staining? 15 A. Yes. 16 Q. And it typically is done 17 without dispersion staining, correct? 18 A. Correct. 19 MR. FINCH: Can I have the next 20 document? 21 (Dyar Exhibit 22 marked for 22 identification.) 23 QUESTIONS BY MR. FINCH: 24 Q. What are we up to? 22. 25 So this is Figure 21 out of</p>	<p>Page 281</p> <p>1 A. Correct. 2 Q. Analyzed by Paul Hess on 3 12/11/2018? 4 A. That information isn't here, 5 but... 6 Q. This should be -- do you have 7 the first page of the -- keep going 8 backwards. 9 A. Ah. This, yes. Okay. Got it. 10 Q. All right. So sample 11 M69680-015BL is the sample -- M69680-015BL, 12 that's the sample -- it's from the same 13 sample that you're looking at in Figure 21 in 14 your expert witness report. 15 Right, ma'am? 16 A. If that's what the label says, 17 then, yes. 18 Q. Okay. So the first page of 19 Exhibit 22 -- is that 22, ma'am? 20 A. Yes. 21 Q. It says Section 13. 22 The second is a page entitled 23 "PLM Analysis" that has the sample listed, 24 correct? 25 A. Here?</p>

<p>Page 282</p> <p>1 Q. Yes.</p> <p>2 A. Yeah.</p> <p>3 Q. What is the third page of</p> <p>4 Exhibit --</p> <p>5 A. It's an image.</p> <p>6 Q. It's an image with a dispersion</p> <p>7 staining, correct?</p> <p>8 MR. CHACHKES: Just to make</p> <p>9 sure we're on the -- literally the</p> <p>10 same page, are you looking at the red</p> <p>11 page or the gold, black page?</p> <p>12 MR. FINCH: I'm looking at the</p> <p>13 gold and black page. Yeah, so you're</p> <p>14 not on the same page.</p> <p>15 THE WITNESS: Yep. Yep.</p> <p>16 MR. FINCH: I'm looking at the</p> <p>17 gold and black page. This is --</p> <p>18 MR. CHACHKES: Not that page.</p> <p>19 MR. FINCH: This page.</p> <p>20 MR. CHACHKES: You're counting</p> <p>21 from different numbers.</p> <p>22 THE WITNESS: Oh, got it.</p> <p>23 Okay.</p> <p>24 QUESTIONS BY MR. FINCH:</p> <p>25 Q. This is M69680-015BL-001.</p>	<p>Page 284</p> <p>1 yes.</p> <p>2 Q. That's what it says right on</p> <p>3 the document, right?</p> <p>4 MR. CHACHKES: Now what page</p> <p>5 are we on?</p> <p>6 MR. FINCH: I'm on the page</p> <p>7 that is identical to the page that's</p> <p>8 Figure 21 in her expert witness</p> <p>9 report.</p> <p>10 THE WITNESS: That's what it</p> <p>11 says, elongation, yes.</p> <p>12 MR. CHACHKES: No, you're</p> <p>13 looking at your report. I'm saying</p> <p>14 which -- what page are you looking at</p> <p>15 in that Section 13?</p> <p>16 MR. FINCH: Well, 1, 2, 3, 4,</p> <p>17 5, 6, 7, 8, 9, 10, 11, 12, 13.</p> <p>18 13th page of Section 13 --</p> <p>19 MR. CHACHKES: Okay.</p> <p>20 MR. FINCH: -- of Exhibit 22.</p> <p>21 THE WITNESS: Ah, this lovely</p> <p>22 grain, yes.</p> <p>23 MR. FINCH: If you look on the</p> <p>24 Elmo, I've got it.</p> <p>25 THE WITNESS: Yeah, that's</p>
<p>Page 283</p> <p>1 That's dispersion staining, correct?</p> <p>2 A. Well, when you put -- you can</p> <p>3 use different wave plates to change the</p> <p>4 color. Often dispersion staining images are</p> <p>5 pink. It's also possible to have that color</p> <p>6 from a different kind of wave plate. So I'm</p> <p>7 not -- I don't think that these -- in some</p> <p>8 cases they were specifically labeled as such.</p> <p>9 I don't happen to recall what this one was</p> <p>10 labeled as.</p> <p>11 Q. Well, you said in your report</p> <p>12 that sample M69680-015BL-003 is a dispersion</p> <p>13 staining image, correct?</p> <p>14 You say that at page 49. "The</p> <p>15 view of the left is pink because it is a</p> <p>16 dispersion staining image," right?</p> <p>17 A. I do see that, but the same</p> <p>18 thing could be true with the wave plate. So</p> <p>19 it doesn't really matter whether it's a</p> <p>20 dispersion staining image or a -- just a</p> <p>21 normal wave plate image.</p> <p>22 Q. This is --</p> <p>23 A. You interpret them differently.</p> <p>24 Q. This is an elongation image?</p> <p>25 A. That's what you're telling me,</p>	<p>Page 285</p> <p>1 right. I have it in my report. I</p> <p>2 know what it looks like.</p> <p>3 Here, I'll just look at it on</p> <p>4 Alex.</p> <p>5 QUESTIONS BY MR. FINCH:</p> <p>6 Q. And so that is an anthophyllite</p> <p>7 elongation image, correct?</p> <p>8 A. There is no way that's what</p> <p>9 that is.</p> <p>10 Q. And there is -- there's no</p> <p>11 indication that this is an image taken with</p> <p>12 dispersion staining, correct, on the picture</p> <p>13 that's large enough to seen?</p> <p>14 A. No, so I might have miswritten</p> <p>15 that it's a dispersion staining image, but</p> <p>16 that doesn't change the fact that that is not</p> <p>17 anthophyllite.</p> <p>18 Q. So you were incorrect when you</p> <p>19 said this was a dispersion staining image; is</p> <p>20 that true?</p> <p>21 MR. LOCKE: Objection.</p> <p>22 THE WITNESS: I honestly don't</p> <p>23 recall.</p> <p>24 The focus of analyzing this</p> <p>25 particular image has nothing to do</p>

<p style="text-align: right;">Page 286</p> <p>1 with whether it's a dispersion image 2 or not. It has to do with the 3 ridiculousness of there happening to 4 be an amphibole grain that happens to 5 be exactly the same length as a talc 6 particle and happens to line up 7 exactly along the edge of the talc 8 particle. That's the point of 9 including this figure in the document. 10 So whether or not it's a 11 dispersion staining image is real 12 pretty irrelevant. 13 QUESTIONS BY MR. FINCH: 14 Q. Now, isn't it true that in the 15 previous two images they take a look at the 16 same material from two different rotations? 17 One of it -- 18 A. Yes. 19 Q. And wouldn't it be the case 20 that if it were a talc particle curled up on 21 edge, it would look different in the 22 M69680-015BL-003? 23 A. Well, these two images were not 24 taken with the same wave plate. Regardless 25 of whether it was dispersion or not, they're</p>	<p style="text-align: right;">Page 288</p> <p>1 referring to? The page in front of the 2 elongation image? Page 12? 3 A. Yeah, it says it's a dispersion 4 staining image, so I guess we have to accept 5 that that's what -- that is what they say it 6 is. 7 But the other one is not -- 8 clearly not the same wave plate, so one would 9 conclude that it was a different accessory. 10 Q. "The other one." What's the 11 other one you're referring to? 12 A. The ones with the pink 13 background. 14 Because accessories are used in 15 polarizing light microscopes to intensify the 16 colors and change them, and so sometimes the 17 background color is diagnostic of the use of 18 a wave plate. 19 Q. So you're saying it's your 20 opinion that the images on pages 11, 12 -- 21 excuse me, 10, 11, 12 and 13 of Exhibit 22 22 are different structures? 23 A. Well, they're obviously 24 different grains. 25 Well, that's not true. In one</p>
<p style="text-align: right;">Page 287</p> <p>1 not taken -- obviously the colors are 2 different, so they weren't taken under the 3 same conditions, so the colors would be 4 different. 5 Q. What I'm asking you is, if it 6 were in fact talc rolled up as opposed to 7 anthophyllite, wouldn't it be the case it 8 would appear differently between the image 9 I'm showing you on the Elmo now and the 10 rotated image that's one page behind it? 11 A. Only if the same wave plate was 12 used in both images. 13 Q. And you don't know whether 14 that's true or not, do you? 15 A. One of them says "perpendicular 16 dispersion" and the other one says 17 "elongation," and I don't recall from the 18 report specifically which ones of these is 19 which. I mean -- but clearly they're not 20 under the same conditions. Because when you 21 put a wave plate under a microscope, the 22 colors intensify as seen in the pink 23 background, and this image clearly does not 24 have any kind of wave plate. 25 Q. Which is the "this" you're</p>	<p style="text-align: right;">Page 289</p> <p>1 case it's the same grain rotated in two 2 directions. Let's see, where is that one? 3 I'm lost in page space. These 4 aren't numbered, so I don't know which ones 5 you're referring to. 6 Q. Well, let's -- we established 7 that the elongation image is the 13th page of 8 Exhibit 22, right? 9 A. Okay. This is page 13, yes. 10 Q. All right. The page before 11 that is the same sample, anthophyllite 12 perpendicular dispersion, correct? 13 A. Yes. 14 Q. And then they rotate the 15 sample, and it is the same sample, 16 anthophyllite parallel dispersion? 17 A. Well, that's the way it's 18 labeled, yes. 19 Q. So if it were in fact the same 20 sample they've turned two different ways, 21 would you agree with me that that can't be 22 talc rolled up on its side? 23 A. No. 24 Q. Why not? 25 A. Because the optical properties</p>

<p style="text-align: right;">Page 290</p> <p>1 of talc, when you look down on the sheets, 2 are different than the optical properties of 3 talc when you look perpendicular to the 4 sheets. 5 Q. What's a cross-polar? 6 A. A cross-polar is a piece of 7 glass that is manufactured in such a way that 8 light vibrating in one direction -- only one 9 direction gets -- passes through, like a 10 polarizing pair of sunglasses. 11 Q. On page 48 and 49 of your 12 report, you state that the Su 2003 paper 13 requires looking at 10 to 20 grains? 14 A. I believe I quote from the Su 15 document in here somewhere, yes. 16 Q. It says, "After 10 to 20 fibers 17 are examined in this way, 10 to 20 fibers 18 were examined in the extinction position." 19 What's the difference between 20 the extinction position and the original 21 position? 22 A. So extinction is when the 23 microscope stage is rotated so the grain 24 becomes dark. 25 It's on page 47, is where the</p>	<p style="text-align: right;">Page 292</p> <p>1 determination that the images that you 2 examined contained cleavage fragments and not 3 fibers? 4 A. Because in my career I've 5 looked at hundreds of thousands of cleavage 6 fragments of minerals under a microscope, and 7 I know what they look like. 8 The -- and I can consistently 9 identify a cleavage fragment based on having 10 looked at hundreds of thousands of cleavage 11 fragments in my career. 12 Q. So your opinion that what 13 Dr. Longo's analysts are calling bundles of 14 asbestos fibers are in fact cleavage 15 fragments is based on your looking at 16 hundreds of thousands of cleavage fragments 17 under a microscope throughout your career. 18 That's what it's based on, 19 right? 20 A. That, and the research that I 21 did, some of the images that are included in 22 my report such as -- oh, let's see. They're 23 on the morphology section. 24 So, for example, the paper by 25 Campbell, et al., 1977, gives examples of</p>
<p style="text-align: right;">Page 291</p> <p>1 quote is from Su. 2 Q. Uh-huh. 3 A. And it says pretty clearly, 4 "After 10 to 20 fibers are examined in this 5 way, the fiber with the longest is" -- the 6 longest must be refractive index -- "is 7 assumed to exhibit the refractive index 8 closest to N alpha." 9 But again, there's -- I don't 10 recall any information in either of these 11 reports that says that they used -- they 12 examined 10 to 20 fibers. 13 Q. Are there any PLM analyses that 14 Dr. Longo's lab performed that you would 15 agree do show asbestos fibers? 16 A. No. 17 Q. Not a single one? 18 A. No, because let's recall that 19 polarized light microscopy can tell you 20 something about the composition, if properly 21 done, and something about the morphology. 22 And all of the images that I examined contain 23 what I consider to be cleavage fragments, not 24 fibers. 25 Q. Okay. How did you make the</p>	<p style="text-align: right;">Page 293</p> <p>1 asbestiform versus non-asbestiform particles. 2 The paper by Gunther in 2010 3 gives examples of asbestiform and 4 non-asbestiform particles. 5 The paper by Harper in 2010 6 gives examples of what asbestiform and 7 non-asbestiform particles look like. 8 The paper by Pierce in 2017 9 gives examples of what cleavage fragments 10 look like. 11 So I would say that I rely on 12 my background of identifying cleavage 13 fragments, along with careful review of the 14 peer-reviewed literature for what constitutes 15 a cleavage fragment, to make my judgment 16 about what is in these samples. 17 MR. FINCH: Lizzy, can I have 18 the pictures? You know, the redacted 19 pictures? 20 QUESTIONS BY MR. FINCH: 21 Q. So am I correct that you can 22 tell by looking at a photomicrograph whether 23 something is a bundle or a cleavage 24 fragment -- 25 MR. CHACHKES: Objection.</p>

<p style="text-align: right;">Page 294</p> <p>1 QUESTIONS BY MR. FINCH:</p> <p>2 Q. -- based on your expertise and</p> <p>3 your judgment?</p> <p>4 A. That's not what I said.</p> <p>5 I said I have identified</p> <p>6 hundreds of thousands of cleavage fragments</p> <p>7 in my career. I have very little experience</p> <p>8 looking at amphibole bundles in thin section,</p> <p>9 which is why I referred to the literature to</p> <p>10 find what those images look like.</p> <p>11 Q. So you have very little</p> <p>12 experience of identifying amphibole bundles,</p> <p>13 correct?</p> <p>14 MR. LOCKE: Objection.</p> <p>15 MR. CHACHKES: Objection.</p> <p>16 THE WITNESS: That's what I</p> <p>17 said.</p> <p>18 QUESTIONS BY MR. FINCH:</p> <p>19 Q. You have very little experience</p> <p>20 in looking for asbestos fibers under a</p> <p>21 polarized light microscope, correct?</p> <p>22 A. I have looked at asbestos</p> <p>23 fibers under a polarized light microscope in</p> <p>24 the course of teaching for many years.</p> <p>25 Q. How many times?</p>	<p style="text-align: right;">Page 296</p> <p>1 Q. -- of the particles?</p> <p>2 Okay. But you just told me</p> <p>3 that you had very little experience in</p> <p>4 reviewing images of asbestiform asbestos</p> <p>5 bundles under a polarized light microscope or</p> <p>6 any other kind of light -- any other kind of</p> <p>7 microscope; is that correct?</p> <p>8 MR. CHACHKES: Objection.</p> <p>9 THE WITNESS: Boy, I don't</p> <p>10 think of it as reviewing images. I've</p> <p>11 looked down a microscope plenty of</p> <p>12 times at asbestos.</p> <p>13 In my experience, most of the</p> <p>14 asbestos I've looked at has not been</p> <p>15 bundles.</p> <p>16 QUESTIONS BY MR. FINCH:</p> <p>17 Q. And my question is: How many</p> <p>18 times have you looked down a microscope at</p> <p>19 asbestos fibers?</p> <p>20 Is it more than a hundred?</p> <p>21 A. Well, now you're changing the</p> <p>22 question. Before it was about bundles, and</p> <p>23 now it's about fibers.</p> <p>24 How many times have I looked at</p> <p>25 asbestos under a microscope --</p>
<p style="text-align: right;">Page 295</p> <p>1 A. Oh, we covered the amphibole</p> <p>2 minerals in mineralogy as a routine thing. I</p> <p>3 think I've taught mineralogy 20 times, so</p> <p>4 that would be 20 weeks of my life spent</p> <p>5 teaching what kind of -- what amphiboles look</p> <p>6 like.</p> <p>7 Q. How about time spent analyzing</p> <p>8 structures to determine whether or not they</p> <p>9 are asbestiform asbestos bundles versus</p> <p>10 something else?</p> <p>11 How much time have you spent on</p> <p>12 a regular basis as part of your academic</p> <p>13 career doing that?</p> <p>14 A. Well, let's go back to my</p> <p>15 report for a minute and remember that the key</p> <p>16 methodology for distinguishing between</p> <p>17 asbestiform and non-asbestiform minerals is</p> <p>18 by careful analysis of the populations based</p> <p>19 on the dimensions of the particles.</p> <p>20 So that is -- that</p> <p>21 identification is not something that we would</p> <p>22 do in mineralogy.</p> <p>23 Q. You're talking about the</p> <p>24 statistical analysis --</p> <p>25 A. Correct.</p>	<p style="text-align: right;">Page 297</p> <p>1 Q. Yes.</p> <p>2 A. -- when I knew it was asbestos</p> <p>3 from independent means, and I had a</p> <p>4 macroscopic hand sample, and I myself had</p> <p>5 prepared the thin section for my class?</p> <p>6 Literally hundreds.</p> <p>7 Q. How about when you're</p> <p>8 attempting to determine what it is, whether</p> <p>9 it's asbestos or not?</p> <p>10 A. I think we've already</p> <p>11 established that I was not asked to do</p> <p>12 testing in this case, and so I have not</p> <p>13 looked at any -- any of the talc samples,</p> <p>14 period.</p> <p>15 Q. No, my question is: Ever in</p> <p>16 your career, have you attempted to identify</p> <p>17 asbestos fibers in a substance where you</p> <p>18 didn't know what it was?</p> <p>19 A. No.</p> <p>20 But that's pretty similar to</p> <p>21 the way Drs. Longo and Rigler treat their</p> <p>22 analyses as well, because they presume that</p> <p>23 everything they look at that's a particle is</p> <p>24 either a bundle or a frag -- sorry, a bundle</p> <p>25 or a fiber. There's no case in their notes</p>

<p style="text-align: right;">Page 298</p> <p>1 where they -- well, it might be a few, where 2 they say something is a cleavage fragment. 3 But they seem to only identify things as one 4 or the other. 5 MR. FINCH: I'll object and 6 move to strike everything after the 7 word "no." 8 QUESTIONS BY MR. FINCH: 9 Q. All right. Let's -- well, 10 actually, there's a few more technical things 11 before we get to this, so... 12 On page 50 and 51 of your 13 report, you fault Dr. Rigler and Longo for 14 not using point counting to estimate the 15 concentration of asbestos by PLM, correct? 16 A. Correct. I found no 17 information in their report to indicate they 18 use point counting. 19 Q. Okay. And you're relying on 20 ISO 22262-1 for your conclusion that point 21 counting is a methodology they should have 22 followed to estimate asbestos by weight? 23 A. No, I'm relying on the quote 24 from ISO 2262 {sic} to say that the accuracy 25 of a point count is dependent on the number</p>	<p style="text-align: right;">Page 300</p> <p>1 It's possible that that quote 2 comes from a different ISO document. I'd 3 want to look that up. 4 Q. Is it possible that it comes 5 from ISO 22262-2? 6 A. Yeah, let's take a look. 7 Q. ISO 22262-2, page 23. 8 A. Interestingly, there are no 9 page numbers in this document. 10 Q. You have Dyar 5? 11 A. Yeah. 12 MR. CHACHKES: I think the page 13 numbers were cut off on our copies. 14 MR. FINCH: Oh. 15 QUESTIONS BY MR. FINCH: 16 Q. It's Section 14.2.3.4. 17 A. Got it. Ah, yes, this is where 18 the point counting is. 19 Okay. Now we are all literally 20 on the same page. 21 Q. Okay. Now, the reference that 22 you have in your report on page 50 and 51 is 23 incorrect, and it should be to ISO 22262-2? 24 A. Right. So the 1 should be a 2. 25 Q. At page 23?</p>
<p style="text-align: right;">Page 299</p> <p>1 of grains counted. That is the context in 2 which that statement is made. 3 Q. Okay. You're referring to -- 4 your citation is to ISO 22262-1, page 29, 5 right? 6 A. No, page 50 to 51 where I say, 7 "It is well-recognized that the accuracy of a 8 point count depends on the number of grains 9 counted. This is acknowledged in ISO 10 22262-2, which says," et cetera, et cetera. 11 Q. All right. Let's get ISO 12 22262-1. 13 A. So that should be on page 29, 14 that quote. 15 Q. We're on page 29 of ISO 16 22262-1, is that quote. 17 A. That's what it says. It looks 18 like there might be an error in that. 19 Q. Isn't the quote that you're 20 talking about found on page 23? 21 A. Yeah, that might have been a 22 typo. Although I don't see it on page 23. 23 Q. Let's see. 24 A. Let's see if we can find it 25 here. Point counting.</p>	<p style="text-align: right;">Page 301</p> <p>1 A. In the footnote, yes. 2 Q. Right. Okay. 3 Do you agree with me that talc 4 particles and any accessory minerals found in 5 talc can have different sizes? 6 A. Certainly. 7 Q. Can they have different 8 thicknesses? 9 A. Certainly. 10 Q. Can they have different 11 densities? 12 A. What do you mean, "can they 13 have different densities?" 14 Q. Can the talc particles and the 15 accessory minerals have different densities? 16 A. Certainly. 17 Q. Can different accessory 18 minerals have different densities? 19 A. They may. 20 Q. Can talc particles have 21 different thicknesses from other talc 22 particles? 23 A. Yes. Or they could be the 24 same. 25 When you make a grain mount,</p>

<p style="text-align: right;">Page 302</p> <p>1 you have no guarantees of what thicknesses of 2 anything are. 3 Q. And would you agree that the 4 point counting methodology that ISO 22262 5 refers to -- refers you back to ISO 22262-1 6 to describe how to do point counting? 7 A. I don't see that right here. 8 You want to tell me where it 9 says that? 10 Q. I misspoke. I'm sorry. 11 Section 14.2-3-4 is where it 12 talks about "the statistical reliability of a 13 point count for determination of asbestos 14 depends on the number of asbestos points, not 15 on the total nonempty points examined." 16 That's the quote you have -- 17 A. That's the quote. 18 Q. -- in your report? 19 A. Yes. 20 Q. Okay. And the determination of 21 amphibole in talc is found on page 29 of ISO 22 22262-2, correct? 23 MR. CHACHKES: So we don't have 24 page numbers. 25 MR. FINCH: Page -- it's 16.3.</p>	<p style="text-align: right;">Page 304</p> <p>1 relative projected areas occupied by 2 different particle species on a microscope 3 slide. The integrated relative volumes of 4 different particle species can be calculated 5 from a conventional point count, but only if 6 the particles are all of the same thickness. 7 If the densities of the various particle 8 species are known, the relative weights of 9 the different particle species can be 10 calculated. However, conventional point 11 counting does not produce correct results 12 when applied to the determination of the 13 proportion of asbestos in a mixture of 14 particles with a wide range of different 15 thicknesses and different densities." 16 Did I read that correctly? 17 A. You did. 18 So I think the point here is 19 twofold. There's not -- there's very little 20 information in the Longo and Rigler reports 21 about the PLM procedures used. And in fact, 22 in most cases when we do this in the 23 laboratory, we sieve the samples so the 24 particles are all the same size. 25 So one normal, logical</p>
<p style="text-align: right;">Page 303</p> <p>1 16.3. 2 THE WITNESS: Yep. 3 QUESTIONS BY MR. FINCH: 4 Q. Okay. This talks -- 5 A. That describes a centrifuge 6 procedure, yes. 7 Q. And then it refers you back. 8 It says, "Quantify any asbestiform amphibole 9 in the centrifugate by the point counting 10 procedure specified in 14.2.3," right? 11 A. Of this document, yes. 12 Q. Yes. Of ISO 22262-2. 13 A. Which is the minimum of 20 14 asbestos points or the equivalent of 13,000 15 nonempty points. That's what it's referring 16 to, yes. 17 Q. Right. 18 But if you go to the beginning 19 of Section 14.2.3, that's the section that 20 refers you back to point counting by PLM or 21 SEM that's found on page 20 of the exhibit. 22 It's the beginning of 14.2.3. 23 A. Yes. 24 Q. All right. What it states is, 25 "Conventional point counting determines the</p>	<p style="text-align: right;">Page 305</p> <p>1 assumption would be that they sieve their 2 particles before they did the PLM analysis. 3 It doesn't say that they did not; it doesn't 4 say that they did. There's not just enough 5 information to know if that's what they did. 6 Q. Isn't it true that 7 Section 14.2.3 that I just read you said that 8 point counting is not accurate if the -- to 9 determine the proportion of asbestos in a 10 mixture of particles with a wide range of 11 different thicknesses and different 12 densities? 13 A. That is indeed what the 14 document says. And what I'm telling you is 15 that it's also possible that the data in the 16 Longo, Rigler reports were all from a sieved 17 sample which were, in fact, the same grain 18 size, in which case you would be able to 19 extract useful information out of it. 20 But the germane point here is 21 what's in my report, and that is that the 22 Longo and Rigler analysts didn't do any of 23 this. They just used visual estimates rather 24 than point counting. And they say in their 25 deposition that they used -- compare visual</p>

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<p>1 comparisons against unspecified and 2 unregulated weight percent standards. 3 But the results of those are 4 really un -- different from the ones from TEM 5 and, therefore, I consider them to be 6 unreliable. 7 MR. CHACHKES: Incidentally, 8 we've been going over a little over an 9 hour, if you reach a wrapping-up 10 point. 11 MR. FINCH: Two more questions, 12 and then we'll stop for a break. 13 MR. CHACHKES: Always two. 14 QUESTIONS BY MR. FINCH: 15 Q. But you have no information 16 about whether or not they had sieved the 17 samples so that all the particles were of the 18 same thickness and the same density before 19 analyzing them, correct? 20 A. Correct. 21 Q. And ISO 22262-2, 22 Section 14.2.3, says that point counting does 23 not produce correct results when the asbestos 24 is in a mixture of particles with a wide 25 range of different thicknesses and different</p>	<p>1 Point counting is not just used 2 in the asbestos industry. Point counting is 3 a time-honored geologic technique that's been 4 used for probably a hundred years. 5 MR. FINCH: Let's take a break. 6 VIDEOGRAPHER: All right. The 7 time is 4:58 p.m. Off the record. 8 (Off the record at 4:58 p.m.) 9 VIDEOGRAPHER: Okay. We are 10 back on the record. The time is 11 5:32 p.m. 12 QUESTIONS BY MR. FINCH: 13 Q. Good afternoon, Professor Darby 14 Dyar. 15 At page 53 of your report -- 16 this is Exhibit 2 to your deposition, your 17 expert witness report. 18 A. Sorry, what page is that again? 19 Q. 53. 20 A. I'm there. 21 Q. All right. On page -- at 22 Figure 23 A, images of non-asbestiform 23 particles from Gunther 2010. 24 Do you see that? 25 A. Yes.</p>
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<p>1 densities, correct? 2 A. But, sir, your point is moot 3 because the point I make in my report is that 4 they didn't even use point counting. So 5 regardless of whether they sieved the samples 6 or not, they didn't do point counting, so 7 it's unclear to me why this is even relevant. 8 Q. Isn't one reasonable 9 interpretation of ISO 22262-2 is that you're 10 not supposed to do point counting if you're 11 analyzing asbestos found in a material with a 12 wide range of different thicknesses and 13 different densities? 14 A. No, because it would be 15 entirely possible to sieve the samples to 16 make sure they were all the same grain size. 17 Q. Does it say anywhere in ISO 18 22262-2 to sieve all the samples so that 19 they're the same particle and grain size? 20 A. It doesn't need to say that. 21 It says that if they are a different grain 22 size, you won't get good results. So that 23 implies that if you wanted to get good 24 results, you would sieve the samples, which 25 is the standard protocol.</p>	<p>1 Q. Those are images taken from the 2 paper that you and I looked at earlier today, 3 Mickey Gunther's 2010 paper entitled 4 "Defining Asbestos Differences Between the 5 Built and Natural Environments"? 6 A. Mickey's written a lot of 7 papers, but if that's what I say, then that's 8 the one I reference, yes. 9 Q. Well, you referred to Gunther 10 2010. I'm just -- 11 A. Well, hang on. Let's take a 12 look here. 13 Yes. So between -- yep, that's 14 it. Yep. 15 Q. Okay. 16 A. Do you want me to pull that 17 out? 18 Q. No. No. No. 19 A. That is indeed where those 20 images came from. 21 Q. Those images came from what we 22 have marked to our deposition as exhibit -- 23 your Deposition Exhibit 11, correct? 24 A. Yeah. Might turn the page, I'm 25 sure. Yeah, they're in there.</p>

<p style="text-align: right;">Page 310</p> <p>1 Q. Okay. Were you aware at the 2 time that Mr. Gunther wrote this paper that 3 he was serving as an expert witness for the 4 RT Vanderbilt talc company and issuing expert 5 reports that called the materials that were 6 found in Gouverneur talc, Gouverneur, 7 New York, talc, non-asbestiform cleavage 8 fragments as opposed to asbestos -- 9 asbestiform fibers? 10 MR. CHACHKES: Objection. 11 THE WITNESS: No, I was not 12 aware of any of that. 13 QUESTIONS BY MR. FINCH: 14 Q. Are you aware that there has 15 been an epidemic of mesothelioma from 16 employees of the Gouverneur talc mine in and 17 around the -- who were employed by the 18 Gouverneur talc mine by RT Vanderbilt? 19 MR. LOCKE: Objection. 20 THE WITNESS: No, I'm not aware 21 of that. 22 MR. FROST: Objection. 23 QUESTIONS BY MR. FINCH: 24 Q. Are you aware that the EPA 25 Region 9 has criticized Dr. Gunther and</p>	<p style="text-align: right;">Page 312</p> <p>1 its mission statement is? 2 MR. CHACHKES: Objection. 3 Form. 4 THE WITNESS: No, I have no 5 knowledge of that. 6 QUESTIONS BY MR. FINCH: 7 Q. You've never heard of Exponent 8 or ChemRisk before? 9 A. No. 10 Q. Are you familiar with the 11 terminology "doubt science" or "distraction 12 science"? 13 MR. CHACHKES: Objection. 14 THE WITNESS: Never heard that 15 term. 16 QUESTIONS BY MR. FINCH: 17 Q. On page 53 of your report you 18 say, "Bundles occur as separable groups of 19 parallel fibers with splayed ends and matted 20 masses as seen in Figure 23 B," as in 21 basketball, right? 22 A. Yes. 23 Q. Do you agree with me that 24 bundles do not have to have splayed ends? 25 A. All I know is that in ISO</p>
<p style="text-align: right;">Page 311</p> <p>1 Mr. Lee's analysis of the distinction between 2 asbestiform and non-asbestiform? 3 MR. FROST: Objection. 4 MR. CHACHKES: Objection. 5 THE WITNESS: No, I'm not aware 6 of that. 7 And I will also point out that 8 in my report I give examples of 9 non-asbestiform particles from other 10 sources such as Campbell 1977 and -- 11 and Pierce 2017. 12 QUESTIONS BY MR. FINCH: 13 Q. All right. Were you aware that 14 Pierce's paper was -- are you aware that 15 Ms. Pierce is an employee -- 16 MR. FINCH: Is it Exponent or 17 ChemRisk? 18 MR. CHACHKES: Are you aware? 19 MR. FINCH: I am, but I'm 20 50-some years old, and remembering 21 everything off the top of my head 22 isn't as easy as it used to be. 23 QUESTIONS BY MR. FINCH: 24 Q. Are you aware of the nature of 25 the entity that employs Ms. Pierce and what</p>	<p style="text-align: right;">Page 313</p> <p>1 22262-1, bundles are described as structures 2 composed of parallel, smaller diameter fibers 3 attached along these -- along their lengths. 4 I think the point is that 5 Drs. Longo and Rigler don't define what a 6 bundle is either, so it's unclear what 7 they -- what they mean when they make those 8 assignments. 9 Q. All right. In page 5 of ISO 10 22262-1, Section 2.29? 11 A. Yeah, I think I stole one of 12 yours. 13 Section 2 point what? 14 Q. 29, 2.29 in the definitions. 15 A. Uh-huh. 16 Q. It says -- it has a definition 17 of fiber bundle, correct? 18 A. Which is exactly the definition 19 I gave, I believe, yes. 20 Q. Well, in your report you say 21 "bundles occur as separable groups of 22 parallel fibers with splayed ends and matted 23 masses." 24 And my question to you was: Do 25 you agree that fiber bundles do not always</p>

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<p>1 exhibit splayed ends?</p> <p>2 A. You know, I've not been called</p> <p>3 upon to make that judgment call, so I can't</p> <p>4 say.</p> <p>5 Q. Will you agree with me that in</p> <p>6 the definition of fiber bundle on page 5,</p> <p>7 Section 2.29 of ISO 22262-1, it states, "A</p> <p>8 fiber bundle may exhibit diverging fibers at</p> <p>9 one or both ends"?</p> <p>10 A. Yes, it does say -- it does say</p> <p>11 that, yes.</p> <p>12 Q. Okay. And you would agree with</p> <p>13 me that "may" does not mean "always"?</p> <p>14 A. Correct.</p> <p>15 But I did not say that bundles</p> <p>16 are defined as. I just said that's how they</p> <p>17 occur. Very important distinction.</p> <p>18 Q. And you would agree with me --</p> <p>19 would you agree with me that you can have a</p> <p>20 bundle of asbestos fibers without splayed</p> <p>21 ends at either end of the bundle?</p> <p>22 MR. LOCKE: Objection. Asked</p> <p>23 and answered.</p> <p>24 THE WITNESS: The definition in</p> <p>25 ISO 22262 makes a note that says that.</p>	<p>1 from counting criteria into characteristics</p> <p>2 for fibers and bundles.</p> <p>3 Q. The section is entitled</p> <p>4 "Morphology," correct?</p> <p>5 A. Yes.</p> <p>6 Q. And it lists A, B and C,</p> <p>7 correct?</p> <p>8 A. Yes, but it says "generally</p> <p>9 recognized." It doesn't say "always</p> <p>10 recognized."</p> <p>11 Q. And would you agree with me</p> <p>12 that it doesn't say that all of these</p> <p>13 characteristics have to be present in order</p> <p>14 for it to be morphology consistent with</p> <p>15 asbestos?</p> <p>16 A. It doesn't say that -- it's not</p> <p>17 clear. The document itself is not clear.</p> <p>18 Q. Are you aware of any -- other</p> <p>19 than the statistical testing using the aspect</p> <p>20 ratio we'll get to it in a minute, are you</p> <p>21 aware of any objective way to determine</p> <p>22 whether or not a structure you're looking at</p> <p>23 is a bundle or a cleavage fragment in terms</p> <p>24 of something you can measure using a tool or</p> <p>25 a technique of --</p>
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<p>1 QUESTIONS BY MR. FINCH:</p> <p>2 Q. It makes a note that it may</p> <p>3 have splayed ends. It also may not have</p> <p>4 splayed ends, too, correct?</p> <p>5 A. That's correct.</p> <p>6 Q. All right. And in</p> <p>7 Section 7.2.3.7.1 of the same document,</p> <p>8 page 22?</p> <p>9 A. 7.2.3 -- yeah, got it.</p> <p>10 Q. It has a description of</p> <p>11 morphology for -- "morphology that is</p> <p>12 characteristic of asbestos is as follows,"</p> <p>13 and then it has a description of the</p> <p>14 morphology characteristics in laboratory</p> <p>15 samples for PLM identification of the fiber</p> <p>16 type.</p> <p>17 Do you see that?</p> <p>18 A. I do see that here.</p> <p>19 Q. Okay. It says, "A, the</p> <p>20 presence of fiber aspect ratios in the range</p> <p>21 of 20 to 1 or higher for fibers longer than</p> <p>22 5 microns."</p> <p>23 Do you see that?</p> <p>24 A. Yes.</p> <p>25 Be careful, you're diverting</p>	<p>1 A. So before I answer that</p> <p>2 question, I'd like to back up to your last</p> <p>3 question and point out that there's a note at</p> <p>4 the end of this section which says, "This is</p> <p>5 intended as guidance for analysts, and it is</p> <p>6 not intended to override the definition of</p> <p>7 asbestos as presented in 2.9."</p> <p>8 So let's make sure we make a</p> <p>9 note of the fact that these morphology</p> <p>10 comments here are intended as guidance and</p> <p>11 not as overriding other considerations</p> <p>12 elsewhere in the document.</p> <p>13 All right. Now --</p> <p>14 Q. And it also refers to national</p> <p>15 regulation. It's not intended to override</p> <p>16 any national regulation, correct?</p> <p>17 A. That's what it says.</p> <p>18 Now, if we can go back to your</p> <p>19 question.</p> <p>20 Q. So my question is: Other than</p> <p>21 the statistical test of aspect ratios on a</p> <p>22 population basis, is there any quantitative,</p> <p>23 objective way that you know of to identify</p> <p>24 the morphology of a bundle as being a bundle</p> <p>25 of asbestos fibers versus a cleavage</p>

<p style="text-align: right;">Page 318</p> <p>1 fragment?</p> <p>2 MR. FROST: Objection to form.</p> <p>3 THE WITNESS: Let's see.</p> <p>4 "Other than."</p> <p>5 So we've established that</p> <p>6 statistical tests of particle</p> <p>7 dimensions on populations are the best</p> <p>8 and only way to determine whether</p> <p>9 something is asbestiform and</p> <p>10 non-asbestiform.</p> <p>11 From an individual particle and</p> <p>12 a two-dimensional image, it is</p> <p>13 impossible to make those kinds of</p> <p>14 judgments.</p> <p>15 QUESTIONS BY MR. FINCH:</p> <p>16 Q. Would you agree with me that</p> <p>17 Section 7.2.3.7.1 says, "In light microscope,</p> <p>18 the asbestiform habit is generally recognized</p> <p>19 by the following characteristics," and it</p> <p>20 lists characteristics that do not discuss the</p> <p>21 statistical testing of a population of -- on</p> <p>22 an aspect ratio basis?</p> <p>23 A. My interpretation of this</p> <p>24 document is verbatim what it says, which is</p> <p>25 this is intended for guidance. It's not</p>	<p style="text-align: right;">Page 320</p> <p>1 the amphibole is probably non-asbestiform,</p> <p>2 with a degree of certainty increasing with</p> <p>3 decreasing maximum aspect ratio. If any</p> <p>4 amphibole fibers longer than 5 microns with</p> <p>5 aspect ratios in the range of 20 to 1 or</p> <p>6 higher are observed, then it can be concluded</p> <p>7 that amphibole asbestos is probably present,</p> <p>8 with a degree of certainty increasing with</p> <p>9 increasing aspect ratio."</p> <p>10 Did I read that correctly?</p> <p>11 A. You read it correctly.</p> <p>12 Q. And it says, if any amphibole</p> <p>13 fibers longer than 5 microns with an aspect</p> <p>14 ratio in the range of 20 or {sic} 1 or higher</p> <p>15 are observed, then it can be concluded that</p> <p>16 amphibole asbestos is probably present.</p> <p>17 Right?</p> <p>18 A. That's what it says.</p> <p>19 Q. So that means -- "any" means</p> <p>20 more than 1, correct?</p> <p>21 If you've got any amphibole</p> <p>22 fibers longer than 5 microns with an aspect</p> <p>23 ratio in the range of 20 or 1 to higher, ISO</p> <p>24 22262-1, Section 7.2.3.7.1, says that it can</p> <p>25 be concluded that amphibole asbestos is</p>
<p style="text-align: right;">Page 319</p> <p>1 intended to be, as it says, a way to</p> <p>2 discriminate between non-asbestiform and</p> <p>3 asbestiform amphibole populations in a</p> <p>4 rigorous way.</p> <p>5 Q. Okay. On page 23, in the same</p> <p>6 section, in the text below number 5 --</p> <p>7 A. Uh-huh.</p> <p>8 Q. -- it has a discussion in the</p> <p>9 second paragraph that begins "In general."</p> <p>10 Do you see that?</p> <p>11 A. Yes.</p> <p>12 Q. Okay. ISO 22262-1 states, "In</p> <p>13 general, for this part of ISO 22262, the</p> <p>14 presence of either the asbestiform or the</p> <p>15 non-asbestiform analogs of tremolite and</p> <p>16 actinolite, anthophyllite or richterite,</p> <p>17 winchite, can usually be specified. If the</p> <p>18 majority of the amphibole fibers longer than</p> <p>19 5 microns have aspect ratios equal to or</p> <p>20 lower than 5 to 1, and if the fibers do not</p> <p>21 exhibit any of the characteristics in C" --</p> <p>22 Which is referring back to</p> <p>23 page 22, correct?</p> <p>24 A. Yes.</p> <p>25 Q. -- "it can be concluded that</p>	<p style="text-align: right;">Page 321</p> <p>1 probably present, with a degree of certainty</p> <p>2 increasing with increasing aspect ratio?</p> <p>3 A. Let us, again, point out that</p> <p>4 immediately following the paragraph you wrote</p> <p>5 {sic} it says, "This is intended for guidance</p> <p>6 for an analyst," first of all.</p> <p>7 And second of all, let's go</p> <p>8 back and look at the populations in this</p> <p>9 particular situation. And in fact, it says</p> <p>10 that the average aspect ratio of all</p> <p>11 particles looked at by Longo and Rigler is</p> <p>12 13.34.</p> <p>13 So under their own</p> <p>14 definition -- or under the definition in this</p> <p>15 document, none of the particles identified by</p> <p>16 Drs. Longo and Rigler would be considered to</p> <p>17 be asbestiform. So you're arguing my own</p> <p>18 point.</p> <p>19 Q. Average doesn't mean -- the</p> <p>20 average -- you said Longo and Rigler found</p> <p>21 that the average aspect ratio was 13 point</p> <p>22 something, correct?</p> <p>23 A. Correct.</p> <p>24 Q. Average is not the same as the</p> <p>25 longest, correct?</p>

<p style="text-align: right;">Page 322</p> <p>1 A. That's correct. But it is also 2 the case that population distribution of 3 non-asbestiform and asbestiform amphiboles 4 would all have some samples since it's an 5 asymptotic distribution potentially in the 20 6 to 1 range. 7 Q. Does -- isn't it true that 8 Dr. Longo and Dr. Rigler did find amphibole 9 fibers that were longer than 5 microns which 10 had an aspect ratio of 20 to 1 or higher? 11 A. I don't know. Very few of 12 them, based on the information in the plot 13 and figure of 28 C, a very, very small 14 percentage of the Longo and Rigler samples 15 have aspect ratios that are greater than 20 16 to 1. 17 Q. Okay. And doesn't it say if 18 any amphibole fibers longer -- any meaning 19 any, not average -- any amphibole fibers 20 longer than 5 microns with aspect ratios in 21 the range of 20 to 1 or higher are observed, 22 then it can be concluded that amphibole 23 asbestos is probably present? 24 That's what ISO 22262-1 says, 25 does it not?</p>	<p style="text-align: right;">Page 324</p> <p>1 of particles was still 13, which is well 2 below 20 to 1. 3 Q. Where does it say that the 4 average aspect -- in ISO 22262-1 does it say 5 in Section C, Section 72371, that the average 6 aspect ratio has to be in the range of 20 to 7 1 or higher? 8 A. It says, "This is intended as 9 guidance for the analyst to discriminate 10 between non-asbestiform and asbestiform 11 amphibole populations." 12 So to me it is implied that 13 these measurements would be made on multiple 14 samples in order to accumulate enough data to 15 understand the population represented. 16 Q. And in analyzing the aspect 17 ratios, am I not correct that in 18 Section 7.2.3.7.1 of ISO 22262-1 they are 19 talking about the aspect ratios for fibers 20 longer than 5 microns? Correct? 21 A. It just gives a guidance that, 22 yes, if any amphibole fibers longer than 23 5 microns -- that's what it says there. 24 Q. And if any amphibole fiber with 25 longer than 5 microns has an aspect ratio of</p>
<p style="text-align: right;">Page 323</p> <p>1 A. That is what it says, but below 2 that it also says "this is intended only as 3 guidance." 4 And then it mentions 5 populations, which is, of course, the more 6 appropriate analysis, which is what I've done 7 in the report. 8 Q. Okay. And in your report when 9 you're analyzing the populations, am I 10 correct that you say that -- you fault 11 Dr. Longo and Rigler for only analyzing the 12 average aspect ratio for particles longer 13 than 5 microns, correct? 14 MR. CHACHKES: Objection. 15 THE WITNESS: Yes, that's what 16 I say. 17 QUESTIONS BY MR. FINCH: 18 Q. All right. And -- 19 A. Well, in point of fact what I 20 say is that they only counted particles with 21 aspect ratios greater than 5 to 1, which 22 improperly biases their results toward 23 finding an asbestiform particle population, 24 although it was unsuccessful. Because even 25 with that limitation, their mean aspect ratio</p>	<p style="text-align: right;">Page 325</p> <p>1 20 to 1 or higher, then it could be concluded 2 that amphibole asbestos is probably present. 3 And this is in a guidance 4 document for analysts to discriminate between 5 non-asbestiform and asbestiform amphibole 6 populations? 7 A. I think we can agree to 8 disagree here. The term "probably" is used 9 in this sentence, and then it's followed by a 10 note that says that this is intended as 11 guidance to discriminate between populations. 12 So I believe that the pop -- 13 the use of populations is the absolute 14 paramount, most useful method for 15 discriminating morphologies. 16 And let's bring it back to the 17 Longo and Rigler report, too. So in the 18 Longo and Rigler report they use TEM to 19 visually distinguish these things, so they 20 are -- their conclusions are not using aspect 21 ratios in any way. 22 Q. Doesn't Dr. Longo have analysis 23 of aspect ratio of the structures he analyzes 24 that you recreate at -- 25 A. He presents that information in</p>

<p style="text-align: right;">Page 326</p> <p>1 his tables, but I believe that in his 2 deposition he indicated that the terminology 3 that's associated with the images is made at 4 the time of acquisition, before there's any 5 analysis -- before any analysis has been 6 undertaken. 7 Q. Isn't it true -- you say in 8 footnote 94, "Although the longer Rigler MDL 9 reports utilize PLM for evaluating optical 10 properties, the reports do not give aspect 11 ratios for studied particles either in the 12 photomicrographs themselves or in any of the 13 tables." 14 A. For the PLM data, I believe 15 that is correct. 16 Q. All right. We just looked at 17 exhibit -- I think it's Exhibit 22, which was 18 Section 13. 19 A. It's in here somewhere. Here 20 we go. 21 Q. And am I correct that in 22 multiple places in the PLM images in 23 Exhibit 22 there are measurements of the 24 length of the structure in microns, and in 25 the tables there are -- there are -- there is</p>	<p style="text-align: right;">Page 328</p> <p>1 QUESTIONS BY MR. FINCH: 2 Q. An aspect ratio is simply 3 dividing the length by the width, right? 4 A. That's correct. 5 But I would point out that many 6 of the images like this one do not include 7 measurements. 8 Q. But the count sheets do that 9 back up the images, correct? 10 A. When they are provided. 11 Q. Did -- 12 A. It's unclear to my -- I'd have 13 to go back and look. It's unclear to me 14 whether both -- whether all the PLM 15 measurements, including those done by Lepoy 16 {phonetic} and those done by Longo and 17 Rigler, included such count sheets. 18 Q. Okay. You say that -- 19 A. But in any case, it's 20 irrelevant because the population mean of all 21 of these particles is not high enough to be 22 consistent with the presence of a population 23 of asbestiform minerals. 24 Q. All right. The population mean 25 that Drs. Longo and Rigler calculated was an</p>
<p style="text-align: right;">Page 327</p> <p>1 data in the count sheets for each structure 2 as to its length and width which would enable 3 you to calculate an aspect ratio? 4 A. What did I exactly say in my 5 report? 6 I was looking for tables that 7 counted aspect ratios, and there is no aspect 8 ratio in this particular document. 9 Q. Right. 10 But the data from which one 11 could calculate aspect ratios is available in 12 every count sheet, correct? 13 A. But that's not what I said. 14 What I said in my report was, 15 the reports do not give aspect ratios for 16 studied particles. 17 Q. The reports give you all the 18 data you need to calculate the aspect ratios 19 for every single particle studied, correct? 20 MR. CHACHKES: Objection. 21 THE WITNESS: I would have to 22 review the data again to make sure 23 that those are all there. I don't 24 recall. 25</p>	<p style="text-align: right;">Page 329</p> <p>1 aspect ratio of 13.34, right? 2 A. By my calculations, yes. 3 Q. And what publication do you 4 rely upon for your conclusion that it is a 5 requirement under the international standards 6 for analyzing asbestos that the aspect -- the 7 average aspect ratio must be higher than 20 8 to 1? 9 MR. CHACHKES: Objection. 10 THE WITNESS: I don't rely for 11 my conclusion on the requirement that 12 the aspect ratio be higher than 20 to 13 1. I'm just pointing out, apropos of 14 the discussion we just had about ISO 15 22262-1, that it happens to mention 16 aspect ratios of greater than 20 to 1. 17 And I'm pointing out that as it 18 happens, the aspect ratio of all the 19 particles' population measured by 20 Longo and Rigler is significantly 21 lower than that. That's all I'm 22 saying. 23 (Dyar Exhibit 23 marked for 24 identification.) 25</p>

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<p>1 QUESTIONS BY MR. FINCH: 2 Q. All right. Let's mark this as 3 Exhibit 23. This is Exhibit Number 23, I 4 hope. 5 Have you ever seen this 6 document before? 7 A. Nope. 8 Q. Do you recognize Richard Lee as 9 the president of the organization that Matt 10 Sanchez works for? 11 A. I assume so. I assume that's 12 what RJ Lee stands for. 13 Q. And Ann Wylie is the scientist 14 we talked about before. You rely on 15 Dr. Wylie's publications in part for your 16 opinions in this case? 17 A. Certainly I cited some of Ann's 18 publications, yes. 19 Q. This is a non-peer-reviewed 20 publication that they put together describing 21 what is asbestos. 22 Do you see that? 23 A. I can see that it's from a 24 non-peer-reviewed source, yes. 25 Q. All right. And on pages 6 and</p>	<p>1 both the mean aspect ratio and the outlier 2 aspect ratios, correct? 3 MR. CHACHKES: Objection. 4 THE WITNESS: As an analyst, 5 once you have the thing in the TEM, 6 you'd like to collect as much data as 7 possible. And, yes, a way as 8 described in my report to determine 9 the population of aspect ratios 10 represented in your sample is to make 11 multiple measurements, yes. 12 QUESTIONS BY MR. FINCH: 13 Q. I believe you said that you 14 have met Ann Wylie but you couldn't pick her 15 out of a crowd; is that correct? 16 A. Correct. 17 Q. Have you communicated with her 18 in any way about your work in this case? 19 A. No. 20 Q. Have you submitted -- well, let 21 me ask you this: Is your expert report in 22 this case, Exhibit 2, been peer-reviewed? 23 A. No. 24 Q. Do you intend to submit it to 25 any peer-reviewed journal?</p>
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<p>1 7 -- 2 Does your copy have pages at 3 the bottom? 4 A. Yes, it does. 5 Q. -- they have pictorial images 6 of asbestos, asbestiform and non-asbestiform 7 materials, correct? 8 A. Yes. 9 Q. And have you analyzed each of 10 the structures identified by Dr. Longo's 11 analysts and pictographs taken by Dr. Longo's 12 analysts to determine whether or not they 13 look more like the middle box under 14 asbestiform than any of the materials -- any 15 of the pictures of non-asbestiform on page 7? 16 A. So the point is that it's very 17 difficult to distinguish images on the basis 18 of one TEM image which is only 19 two-dimensional. You really need multiple 20 measurements of the dimensions of a particle, 21 on multiple particles, in order to make an 22 assertive and a definitive decision. 23 Q. And one way to do that is to 24 analyze the aspect ratio of particles that 25 are 5 microns long or longer to determine</p>	<p>1 A. It would not be appropriate. 2 Q. Why not? 3 A. Because it's simply an analysis 4 of reports. It's nothing worthy of a 5 peer-review journal. It's not -- it's not 6 appropriate. 7 Peer-reviewed journals are for 8 fundamental research, which this is merely a 9 report that critiques something else. Just 10 as I would not ever submit my review of a 11 paper as a peer-review article. 12 MR. FINCH: Can I have the next 13 document? 14 (Dyar Exhibit 24 marked for 15 identification.) 16 QUESTIONS BY MR. FINCH: 17 Q. Let's mark this as 24. 18 Do you rely on US Geological 19 Survey's Mineral Commodity profiles for 20 anything, any aspect of your work? 21 A. No. 22 Q. Do you agree that the US 23 Geological Survey is a reputable source if 24 one is looking to identify what the US 25 Geological Service considers asbestos to be?</p>

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<p>1 MR. CHACHKES: Objection.</p> <p>2 THE WITNESS: I haven't</p> <p>3 researched that, so I don't actually</p> <p>4 have a good answer for that.</p> <p>5 QUESTIONS BY MR. FINCH:</p> <p>6 Q. You cited to a publication by</p> <p>7 Wylie and Virta in your expert witness</p> <p>8 report, correct?</p> <p>9 A. That's correct.</p> <p>10 Q. And were you aware that's the</p> <p>11 same Virta who wrote the USGS Mineral</p> <p>12 Commodity profile "Asbestos" in 2005, by</p> <p>13 Robert L. Virta?</p> <p>14 A. Apparently that's the case.</p> <p>15 Q. And do you agree with me that</p> <p>16 the US Geological Survey Mineral Commodity</p> <p>17 profile for asbestos is the United States</p> <p>18 government's definition of what constitutes</p> <p>19 asbestos from the perspective of the geology</p> <p>20 scientists that work for the USGS?</p> <p>21 MR. CHACHKES: Objection.</p> <p>22 THE WITNESS: You know, you've</p> <p>23 just given me a 56-page document, and</p> <p>24 we have a very short time left. I'd</p> <p>25 be happy to use it to evaluate this</p>	<p>1 because I didn't research that particular</p> <p>2 area.</p> <p>3 Q. Would you agree with me that</p> <p>4 ISO 22262-1, ISO 22262-2 and the Yamate</p> <p>5 document on which you rely don't have any</p> <p>6 techniques or methodologies for measuring</p> <p>7 tensile strength in order to characterize</p> <p>8 something as asbestos or not?</p> <p>9 A. All of those documents define</p> <p>10 fibers as having high tensile strength, and</p> <p>11 they give guidelines for different analytical</p> <p>12 tools that can be used to characterize</p> <p>13 different characteristics of particles, but</p> <p>14 they don't give -- they're not intended to be</p> <p>15 exclusive.</p> <p>16 So, no, I'm not aware that</p> <p>17 those documents include information on how to</p> <p>18 do that. Perhaps there's an ISO 66, whatever</p> <p>19 it is, 4, that will pursue that.</p> <p>20 Q. Turn to Table 11 of exhibit --</p> <p>21 whatever this next one is.</p> <p>22 A. In what?</p> <p>23 Q. 24, the Virta US Geological</p> <p>24 Survey.</p> <p>25 A. I'm sorry, page what?</p>
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<p>1 document, but I can't answer your</p> <p>2 question without actually reading this</p> <p>3 document.</p> <p>4 QUESTIONS BY MR. FINCH:</p> <p>5 Q. Does tensile strength have</p> <p>6 anything to do with determining whether what</p> <p>7 you see under a microscope is a cleavement</p> <p>8 fragment -- a cleavage fragment or an</p> <p>9 asbestos bundle?</p> <p>10 A. So I believe we established</p> <p>11 earlier that the definition of a fiber</p> <p>12 includes the qualifier that it has to be</p> <p>13 flexible and have high tensile strength, and</p> <p>14 that's the definition which is ubiquitous</p> <p>15 across many different sources.</p> <p>16 Q. Is there any peer-reviewed</p> <p>17 publication that you know of that tells you</p> <p>18 how to measure tensile strength in an</p> <p>19 asbestos fiber or bundle which is 20 microns</p> <p>20 long or less?</p> <p>21 A. Well, let's recall that my role</p> <p>22 here is to assess the methodology used by</p> <p>23 Drs. Longo and Rigler, not the methodology</p> <p>24 that they didn't use.</p> <p>25 So I have no opinion on that</p>	<p>1 Q. Page 14, Table 11.</p> <p>2 A. Uh-huh.</p> <p>3 Q. Properties of asbestos fibers.</p> <p>4 Do you see that?</p> <p>5 A. I see.</p> <p>6 Q. All right. There is -- it</p> <p>7 lists essential composition, crystal system.</p> <p>8 Do you see that?</p> <p>9 A. Uh-huh.</p> <p>10 Q. Is that a yes?</p> <p>11 A. I do see that.</p> <p>12 Q. Okay.</p> <p>13 A. The list.</p> <p>14 Q. And then there's a -- there is</p> <p>15 a discussion -- there is a description of</p> <p>16 flexibility at the bottom, right?</p> <p>17 A. Yes.</p> <p>18 Q. There's also a discussion or</p> <p>19 description of tensile strength about</p> <p>20 two-thirds of the way down the chart, right?</p> <p>21 A. There are measurements -- or</p> <p>22 there are numbers reported there, yes.</p> <p>23 Q. All right. Would you agree</p> <p>24 with me that tremolite asbestos is described</p> <p>25 as having poor flexibility as compared to</p>

Melinda Darby Dyar, Ph.D.

<p style="text-align: right;">Page 338</p> <p>1 crocidolite, chrysotile or amosite?</p> <p>2 A. Let's see here. I have no idea</p> <p>3 without reading the paper what this means.</p> <p>4 You're taking this table and asking me to</p> <p>5 interpret it completely out of context.</p> <p>6 Just because something has poor</p> <p>7 flexibility doesn't mean that it's not</p> <p>8 flexible, and the definition is that it has</p> <p>9 to be flexible.</p> <p>10 In fact, the numbers indicated</p> <p>11 here for tensile strength indicate that these</p> <p>12 things are flexible.</p> <p>13 Q. Well, isn't it true that the</p> <p>14 tensile strength is measured in thousand</p> <p>15 pascals?</p> <p>16 A. It is reported in thousand</p> <p>17 pascals, according to this chart.</p> <p>18 Q. Right.</p> <p>19 And, for example, tremolite and</p> <p>20 anthophyllite -- let's start with</p> <p>21 anthophyllite. That's 27,000 pascals or</p> <p>22 less, right?</p> <p>23 A. That's what it says here.</p> <p>24 Q. And that is -- and then</p> <p>25 actinolite is 6,000 pascals or less, correct?</p>	<p style="text-align: right;">Page 340</p> <p>1 and flexibility was not done by Drs. Longo</p> <p>2 and Rigler, and this document makes it clear</p> <p>3 that it is possible.</p> <p>4 So another method --</p> <p>5 methodological flaw of this Longo and Rigler</p> <p>6 report, which you've nicely given me the data</p> <p>7 for, is that in fact it is possible to</p> <p>8 measure tensile strength for these particles,</p> <p>9 and Drs. Longo and Rigler did not do so.</p> <p>10 Q. Do you know if the tensile</p> <p>11 strength measured in this document is from</p> <p>12 microscopic particles or particles that are</p> <p>13 large enough to see by the naked eye?</p> <p>14 A. Again, I've only looked at this</p> <p>15 document for a total of three minutes. I</p> <p>16 have not had adequate time to either read</p> <p>17 what the explanation says or to go back and</p> <p>18 look at the references to determine the</p> <p>19 particle sizes, so I can't answer that</p> <p>20 question.</p> <p>21 Q. Can you point to a source that</p> <p>22 you would consider reliable for what is the</p> <p>23 minimum threshold for tensile strength to</p> <p>24 characterize a given structure as asbestos or</p> <p>25 not?</p>
<p style="text-align: right;">Page 339</p> <p>1 MR. CHACHKES: Objection.</p> <p>2 THE WITNESS: That's what it</p> <p>3 says here.</p> <p>4 QUESTIONS BY MR. FINCH:</p> <p>5 Q. And tremolite is 6800 to</p> <p>6 55,000, correct?</p> <p>7 A. That's what it says here.</p> <p>8 Q. Would you agree with me that</p> <p>9 the low range for tensile strength for</p> <p>10 tremolite asbestos is two orders of magnitude</p> <p>11 less than the tensile strength for the low</p> <p>12 end of crocidolite?</p> <p>13 A. According to these numbers,</p> <p>14 yes, but I have -- would have to have more</p> <p>15 time to review this document to determine</p> <p>16 where those numbers came from and how</p> <p>17 reliable they are.</p> <p>18 It looks like some of those</p> <p>19 come from studies that were done in the</p> <p>20 1950s, and I would question the reliability</p> <p>21 of those.</p> <p>22 So that would be my response to</p> <p>23 this.</p> <p>24 And I would also go back and</p> <p>25 say that quantification of tensile strength</p>	<p style="text-align: right;">Page 341</p> <p>1 A. I believe I've already stated</p> <p>2 in this deposition that I am not familiar</p> <p>3 with the analytical techniques used to</p> <p>4 measure tensile strength or flexibility</p> <p>5 because I was -- they were not among the</p> <p>6 methods used by Drs. Longo and Rigler, and my</p> <p>7 job here was to assess the methodology.</p> <p>8 So this whole issue is not</p> <p>9 relevant to that particular documents --</p> <p>10 those particular documents except as to say</p> <p>11 they didn't measure this. So...</p> <p>12 Q. Do you have any understanding</p> <p>13 one way or another as to whether OSHA, the</p> <p>14 Occupational Safety and Health</p> <p>15 Administration, and MSHA, the Mine Safety and</p> <p>16 Health Administration, regulate fibrous talc</p> <p>17 as asbestos?</p> <p>18 MR. FROST: Objection.</p> <p>19 MR. CHACHKES: Objection.</p> <p>20 THE WITNESS: I know nothing</p> <p>21 about that.</p> <p>22 QUESTIONS BY MR. FINCH:</p> <p>23 Q. Do you know whether or not IARC</p> <p>24 considers fibrous talc to be an asbestiform</p> <p>25 mineral?</p>

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<p>1 MR. FROST: Objection.</p> <p>2 MR. CHACHKES: Objection.</p> <p>3 THE WITNESS: I don't recall</p> <p>4 seeing that in the IARC documents I</p> <p>5 read, but my focus in these documents</p> <p>6 was to assess methodology. It</p> <p>7 wasn't -- it wasn't to consider talc</p> <p>8 itself.</p> <p>9 QUESTIONS BY MR. FINCH:</p> <p>10 Q. I notice you don't have any</p> <p>11 criticism of Dr. Longo and Rigler's</p> <p>12 conclusions of the particles they find that</p> <p>13 are fibrous talc; is that correct?</p> <p>14 A. I didn't consider them. I</p> <p>15 considered only the question of methodology</p> <p>16 as it relates to the presence or absence of</p> <p>17 asbestiform minerals.</p> <p>18 Q. So the methodology they</p> <p>19 followed to determine the presence or absence</p> <p>20 of fibrous talc was not a subject of your</p> <p>21 work or analysis in this report in this case,</p> <p>22 correct?</p> <p>23 MR. CHACHKES: Objection.</p> <p>24 THE WITNESS: Talc is not a</p> <p>25 regulated asbestos mineral and,</p>	<p>1 USGS report, we saw that those were the units</p> <p>2 that were used, yes.</p> <p>3 Q. Well, the units that were used</p> <p>4 were pascal joules in the USGS report.</p> <p>5 What I also ask you: Isn't it</p> <p>6 true that pounds per square inch can be a</p> <p>7 measurement of tensile strength if you're</p> <p>8 stretching a material as opposed to squishing</p> <p>9 a material?</p> <p>10 MR. FROST: Objection.</p> <p>11 THE WITNESS: Not as far as I</p> <p>12 know.</p> <p>13 QUESTIONS BY MR. FINCH:</p> <p>14 Q. This is the document from a</p> <p>15 textbook. This is the article by Badollet</p> <p>16 cited by the Virta article, "Asbestos: A</p> <p>17 Mineral of Unparalleled Properties," that</p> <p>18 describes the physical properties of</p> <p>19 asbestos.</p> <p>20 Do you see that?</p> <p>21 A. Yes.</p> <p>22 Q. And it's got the tensile</p> <p>23 strength of the various -- of the six</p> <p>24 different regulated varieties of asbestos</p> <p>25 measured in pounds per square inch.</p>
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<p>1 therefore, I did not consider the</p> <p>2 information in the report relating to</p> <p>3 it.</p> <p>4 MR. FINCH: Time. Stop. Off</p> <p>5 the record.</p> <p>6 VIDEOGRAPHER: Off the record?</p> <p>7 MR. FINCH: Off the record. I</p> <p>8 want to go off the record.</p> <p>9 VIDEOGRAPHER: The time is</p> <p>10 6:13 p.m. Off the record.</p> <p>11 (Off the record at 6:14 p.m.)</p> <p>12 VIDEOGRAPHER: The time is</p> <p>13 6:22 p.m. Back on record.</p> <p>14 (Dyar Exhibit 25 marked for</p> <p>15 identification.)</p> <p>16 QUESTIONS BY MR. FINCH:</p> <p>17 Q. Good evening, Professor Darby</p> <p>18 Dyar. We're back on the record after a short</p> <p>19 break.</p> <p>20 I'm going to put what's been</p> <p>21 marked as Exhibit 25 in front of you.</p> <p>22 I believe you agreed with me</p> <p>23 earlier today that tensile strength can be</p> <p>24 measured in pounds per square inch?</p> <p>25 A. So when we were looking at the</p>	<p>1 Do you see that on page 237 at</p> <p>2 the -- at the second --</p> <p>3 A. Well, the first thing I see is</p> <p>4 that this paper was written 67 years ago,</p> <p>5 which would make me doubt the accuracy of</p> <p>6 these measurements, with all due respect to</p> <p>7 this individual.</p> <p>8 Q. Would you --</p> <p>9 A. But I'll take a look at</p> <p>10 page 237.</p> <p>11 Q. Yeah.</p> <p>12 A. That's --</p> <p>13 Q. Tensile strength. They have a</p> <p>14 measurement in pounds per square inch of the</p> <p>15 tensile strength of chrysotile, amosite,</p> <p>16 anthophyllite, crocidolite, tremolite and</p> <p>17 actinolite.</p> <p>18 A. That's a very weird</p> <p>19 measurement, but that's what they give here,</p> <p>20 yes.</p> <p>21 Q. Okay. And then on Table 7 at</p> <p>22 page 241, am I correct that they compare the</p> <p>23 tensile strength of various varieties of</p> <p>24 asbestos to other types of material?</p> <p>25 A. You know, this is a pretty long</p>

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<p>1 document, and I've only had it in my hand for</p> <p>2 two minutes. If you give me a while, I could</p> <p>3 read this.</p> <p>4 There is a table that says</p> <p>5 comparison of tensile strengths, but --</p> <p>6 Q. Comparison of tensile strengths</p> <p>7 of various materials. Table 7, type of</p> <p>8 material for cotton fiber, the tensile</p> <p>9 strength is 73,000 to 89,000 pounds per</p> <p>10 square inch.</p> <p>11 Do you see that?</p> <p>12 A. I see this table, but again, I</p> <p>13 would doubt these measurements given that</p> <p>14 they are 67 years old.</p> <p>15 Q. Okay. Do you agree with me</p> <p>16 that tremolite asbestos has a substantially</p> <p>17 lower tensile strength than wrought iron,</p> <p>18 ingot iron, carbon steel, piano steel wire,</p> <p>19 cotton fiber?</p> <p>20 A. I agree that that's what this</p> <p>21 67-year-old document says, but again, I would</p> <p>22 question this source and ask for more modern</p> <p>23 measurements.</p> <p>24 Q. Do you have any more modern</p> <p>25 measurements of the relationship between the</p>	<p>1 label says in the paper, yes, but I --</p> <p>2 again, I have called into question a</p> <p>3 document that's 67 years old. It's</p> <p>4 probably more. It was probably</p> <p>5 written 68 years ago.</p> <p>6 QUESTIONS BY MR. FINCH:</p> <p>7 Q. 67 years ago the United States</p> <p>8 was able to develop a hydrogen bomb, correct?</p> <p>9 MR. FROST: Objection.</p> <p>10 THE WITNESS: That's correct.</p> <p>11 QUESTIONS BY MR. FINCH:</p> <p>12 Q. Just because technology is old</p> <p>13 doesn't mean it's -- just because science is</p> <p>14 old doesn't mean it's outmoded, correct?</p> <p>15 MR. FROST: Objection.</p> <p>16 THE WITNESS: I don't -- I'm</p> <p>17 not going to render an opinion on</p> <p>18 that.</p> <p>19 QUESTIONS BY MR. FINCH:</p> <p>20 Q. Well, you study rocks found on</p> <p>21 the moon and Mars, right?</p> <p>22 A. As part of my research, yes.</p> <p>23 Q. When is the last time anybody</p> <p>24 put a man on the surface of the moon?</p> <p>25 A. 50 years ago.</p>
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<p>1 tensile strength of tremolite asbestos as</p> <p>2 compared to something like wrought iron?</p> <p>3 A. Again, let's return to the</p> <p>4 point that my goal was to review the</p> <p>5 methodology in this report. And since</p> <p>6 Drs. Longo and Rigler did not consider the</p> <p>7 topic of flexibility or tensile strength in</p> <p>8 their report, then I've not studied this and,</p> <p>9 therefore, cannot render an opinion on this.</p> <p>10 Q. On page 243, Figure 35, what</p> <p>11 does that say that is?</p> <p>12 A. Electron micrograph, amosite</p> <p>13 asbestos times 15200.</p> <p>14 Q. And can you put this on the</p> <p>15 videotape? Just --</p> <p>16 VIDEOGRAPHER: So if you put it</p> <p>17 on the Elmo, it's going to record it.</p> <p>18 MR. FINCH: Oh, it's getting</p> <p>19 recorded. Okay. I thought that was</p> <p>20 the case, but...</p> <p>21 QUESTIONS BY MR. FINCH:</p> <p>22 Q. So the authors of this are</p> <p>23 calling this amosite asbestos?</p> <p>24 MR. FROST: Objection.</p> <p>25 THE WITNESS: That's what the</p>	<p>1 Q. Over 50 years ago?</p> <p>2 A. Uh-huh.</p> <p>3 Q. You -- am I correct that your</p> <p>4 annual salary as a professor is approximately</p> <p>5 \$125,000 a year?</p> <p>6 A. Salaries at Mount Holyoke</p> <p>7 College are not publicly available, so I</p> <p>8 don't know where you got that information,</p> <p>9 and I'm not comfortable indicating my salary.</p> <p>10 Q. Okay. How does your</p> <p>11 compensation that you've been paid by Johnson</p> <p>12 & Johnson for this report compare to your</p> <p>13 annual salary from your full-time job as a</p> <p>14 professor?</p> <p>15 A. At the present time, it's hard</p> <p>16 to say. I have not been doing this very</p> <p>17 long, so it's hard to say.</p> <p>18 And I would also note that I am</p> <p>19 also employed as a senior scientist at the</p> <p>20 Planetary Science Institute in Tucson,</p> <p>21 Arizona, and I receive a considerable</p> <p>22 proportion of my salary from that</p> <p>23 organization as well.</p> <p>24 Q. How does the -- in percentage</p> <p>25 terms, how does the compensation that you've</p>

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<p>1 been paid by Johnson & Johnson in the past 2 four months compare to your total 3 compensation from other sources on an annual 4 basis? 5 MR. CHACHKES: Objection. 6 THE WITNESS: It's certainly 7 less than my total compensation from 8 other sources. 9 QUESTIONS BY MR. FINCH: 10 Q. Is it 50 percent of your total 11 compensation from other sources? 12 A. I actually don't know. 13 My income varies with the 14 number of research grants I have and the 15 number of hours I charge to them, and so it's 16 hard to give a precise answer to that 17 question. 18 Q. Have you ever been given a 19 research grant by the United States 20 government to study whether or not there is 21 asbestos in any material? 22 A. No. Not that I recall. 23 (Dyar Exhibit 26 marked for 24 identification.) 25</p>	<p>1 QUESTIONS BY MR. FINCH: 2 Q. Under Section 13.0, TEM 3 analysis. 4 Do you see that? 5 A. I see that section, yes. 6 Q. Do you agree with Johnson & 7 Johnson's definition of fiber? 8 MR. CHACHKES: Objection. 9 THE WITNESS: I have defined 10 fiber in my report with a very 11 specific definition which has lots of 12 agreement in -- both in my literature 13 and in government documents. 14 QUESTIONS BY MR. FINCH: 15 Q. My question was: Do you agree 16 with Johnson & Johnson's definition of 17 asbestos fiber as found in Exhibit Number 27 18 {sic}? 19 MR. CHACHKES: Objection. 20 QUESTIONS BY MR. FINCH: 21 Q. 26. Or 26, I think. 22 A. So this is not the same 23 definition that I use, but on the other hand, 24 I have not had time to read this document. I 25 don't know what the context of this document</p>
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<p>1 QUESTIONS BY MR. FINCH: 2 Q. Last exhibit, I believe, 3 Exhibit 26. 4 Doctor, Professor Darby Dyar, 5 Exhibit 26 is Johnson & Johnson Consumer 6 Companies Worldwide Specification describing 7 the methodology for the analysis of powdered 8 talc for asbestiform minerals by transmission 9 electron microscopy. 10 Have you ever seen this 11 document before? 12 A. No, sir. 13 Q. Under TEM analysis, you agree 14 with me that what they're talking about here 15 is analyzing talc for asbestiform minerals, 16 right, by TEM? 17 MR. CHACHKES: Objection. 18 THE WITNESS: In the 30 seconds 19 since I was handed this document, I 20 have hardly had time to even read the 21 title. But the title says, "Analysis 22 of Powdered Talc for Asbestiform 23 Minerals by Transmission Electron 24 Microscopy." 25</p>	<p>1 is. 2 I know nothing about this 3 document and would certainly need more time 4 than the remaining ten minutes to render an 5 opinion on this particular document. 6 Q. Okay. Suffice it to say you 7 have not compared the methodology followed by 8 Drs. Longo and Rigler to determine whether or 9 not there is asbestiform minerals in talc 10 with the procedure set forth in Johnson & 11 Johnson's TEM 7024 standard? 12 MR. CHACHKES: Objection. 13 THE WITNESS: I believe that we 14 have established that I have no 15 information and have not reviewed 16 documents relating to anything having 17 to do with Johnson & Johnson testing 18 procedures because that was not my 19 mandate. 20 My mandate was to evaluate the 21 methodology used by Drs. Longo and 22 Rigler. 23 QUESTIONS BY MR. FINCH: 24 Q. Did you bring any books or 25 materials with you today?</p>

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<p>1 A. Me personally, no.</p> <p>2 Q. Did the lawyer for Johnson &</p> <p>3 Johnson bring books or materials that you</p> <p>4 have relied upon as part of your work in this</p> <p>5 case that are -- some of which might be</p> <p>6 sitting on the floor behind you today?</p> <p>7 A. I know that he brought copies</p> <p>8 of my two books.</p> <p>9 Q. Okay. Can we just get the</p> <p>10 two -- your two books, just so I can see --</p> <p>11 have a picture of them on the record?</p> <p>12 MR. CHACHKES: Technically</p> <p>13 they're mine, I purchased them, but I</p> <p>14 can hand them out. Just a second.</p> <p>15 MR. FINCH: It's an interesting</p> <p>16 copyright law question as to who has</p> <p>17 the ultimate ownership --</p> <p>18 THE WITNESS: Yeah, you can buy</p> <p>19 your own so I can get the royalties.</p> <p>20 MR. CHACHKES: Yeah, this is --</p> <p>21 just for the record, this is -- I</p> <p>22 purchased this off of Amazon used, so</p> <p>23 it's -- it might be marked. I don't</p> <p>24 know.</p> <p>25</p>	<p>1 A. I don't actually rely on it. I</p> <p>2 cite it because I happen to be familiar with</p> <p>3 it. But the statistical tests in the report</p> <p>4 are commonplace and can be found in any</p> <p>5 introductory statistics textbook.</p> <p>6 Q. Did you bring anything else</p> <p>7 with you to the deposition today?</p> <p>8 A. No.</p> <p>9 Q. Anything else related -- I</p> <p>10 mean, obviously you brought yourself. I</p> <p>11 assume you brought a cell phone or something.</p> <p>12 But did you bring anything that</p> <p>13 you reviewed or relied upon as part of your</p> <p>14 work in this case to the deposition today?</p> <p>15 A. Other than the documents that I</p> <p>16 already referred to?</p> <p>17 Q. Yes.</p> <p>18 A. No.</p> <p>19 Q. You're almost done.</p> <p>20 The question pending was: Did</p> <p>21 you bring anything that you reviewed or</p> <p>22 relied upon as part of your work in this case</p> <p>23 to the deposition today.</p> <p>24 And you asked me, "Other than</p> <p>25 the documents I already referred to?" and my</p>
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<p>1 QUESTIONS BY MR. FINCH:</p> <p>2 Q. Okay. Mineralogy and Optical</p> <p>3 Mineralogy. This is the book that you wrote</p> <p>4 with Dr. Gunther in 2008 that I showed you an</p> <p>5 excerpt of.</p> <p>6 VIDEOGRAPHER: You want to put</p> <p>7 it on the Elmo?</p> <p>8 MR. FINCH: Sure.</p> <p>9 THE WITNESS: Correct. It</p> <p>10 actually took us a decade to write</p> <p>11 this book, but it was published in</p> <p>12 2008.</p> <p>13 QUESTIONS BY MR. FINCH:</p> <p>14 Q. Okay. And what's the other</p> <p>15 book that you're an author of that you</p> <p>16 brought with you?</p> <p>17 MR. CHACHKES: Counsel brought.</p> <p>18 THE WITNESS: Geostatistics</p> <p>19 Explained, which is listed on my CV</p> <p>20 and referenced in the report.</p> <p>21 QUESTIONS BY MR. FINCH:</p> <p>22 Q. This is the -- one of the</p> <p>23 references that you rely upon for your</p> <p>24 statistical analysis set forth in the</p> <p>25 discussion of the population, correct?</p>	<p>1 qualification was "yes."</p> <p>2 Other than the documents that</p> <p>3 you've already referred to, did you bring</p> <p>4 anything else with you today?</p> <p>5 A. No.</p> <p>6 Q. All right. Are there any</p> <p>7 materials you rely on that are not either</p> <p>8 cited in your expert report or included in</p> <p>9 your reliance list that is attached to the</p> <p>10 back of your expert witness report?</p> <p>11 A. No.</p> <p>12 MR. FINCH: All right. That's</p> <p>13 all the questions I have at this time.</p> <p>14 MR. CHACHKES: I have a few</p> <p>15 questions. We don't have to take a</p> <p>16 break.</p> <p>17 CROSS-EXAMINATION</p> <p>18 QUESTIONS BY MR. CHACHKES:</p> <p>19 Q. Mr. Finch keeps referring to</p> <p>20 you as Ms. Darby Dyar.</p> <p>21 Do you have a graduate degree?</p> <p>22 A. I do. I have a graduate degree</p> <p>23 from MIT. And my last name is Dyar. Darby</p> <p>24 is my middle name.</p> <p>25 Q. Professor Dyar, why are you</p>

<p style="text-align: right;">Page 358</p> <p>1 qualified to critique the Longo and Rigler 2 expert report? 3 A. So my qualifications for 4 reviewing this report are outlined in this 5 particular -- in my report, but among them I 6 have a Ph.D. from MIT. I spent a year as a 7 post doc at Cal Tech. I have been in 8 academia for nearly 40 years and have taught 9 mineralogy at least 20 times. 10 I've written more than 250 11 papers that were published in peer-reviewed 12 scientific literature. I've reviewed 13 hundreds of scientific documents in keeping 14 with the standards of my profession. And 15 I've worked on dozens of papers involving 16 amphibole mineralogy and serpentine 17 mineralogy. 18 Q. And have you received any 19 awards in the field of geology and 20 mineralogy? 21 A. I have. I've been honored to 22 become a fellow of the Mineralogical Society 23 of America, the Geochemical Society, and the 24 Geological Society of America. 25 I have also received national</p>	<p style="text-align: right;">Page 360</p> <p>1 research, it is necessary to use a TEM to 2 make visual examination of the interactions 3 between the microbes and the minerals. 4 So I'm intimately familiar with 5 these analyses myself and have supervised 6 many undergraduate and graduates' theses that 7 use TEM. 8 Q. And could you talk about your 9 experience with analyzing minerals using 10 SAED? 11 A. So in most cases when we 12 analyze something, when we take an image of 13 something with a TEM, we almost always do 14 SAED if it's possible to get a good pattern. 15 And so SAED patterns also 16 figure in my biomineralization research 17 prominently as well as in my teaching. I 18 should say that TEM and X-ray diffraction in 19 various forms are part of a typical topics 20 covered in a mineralogy course, and certainly 21 I would have covered them in my 20 mineralogy 22 courses. 23 Q. And can you talk about your 24 experience with analyzing minerals using EDS? 25 A. So EDS is the poor stepsister</p>
<p style="text-align: right;">Page 359</p> <p>1 and international awards in recognition of my 2 research excellence, including the Shoemaker 3 award from NASA, the Gilbert award from the 4 geological society, the Holly medal from the 5 Mineralogical Society of Canada, and the 6 Helmholtz award from the German space agency, 7 among others. 8 Q. Can you talk about your 9 experience with analyzing minerals with PLM? 10 A. So I first started using PLM as 11 an undergraduate in 1978, which is 41 years 12 ago, and I've used PLM every year since then. 13 I've taught courses in the use of a 14 polarizing light microscope. 15 It's a routine tool used by me 16 whenever I look at a rock for the first time. 17 I drag out the PLM and take a look at the 18 sample. 19 Q. Can you talk to -- about your 20 experience with analyzing minerals using 21 visual inspection with a TEM? 22 A. So, much of my research in the 23 past two decades has involved the field of 24 biomineralization, which is the interaction 25 of microbes in minerals. And in that</p>	<p style="text-align: right;">Page 361</p> <p>1 of the more accurate gold standard for 2 mineral analysis, which is electron probe 3 microanalysis. The two techniques use 4 exactly the same fundamental underlying 5 phenomena, they just have different 6 detectors, which is why EDS is not very 7 sensitive. Electron probe microanalysis is 8 extremely sensitive. 9 So, in fact, when I was a 10 graduate student, I was involved in a lot of 11 analytical technique development for 12 electron-based measurements of chemistry, and 13 these have evolved into these two different 14 tools. 15 So I was involved not just at 16 the ground floor of these methods, but there 17 are now things that I use routinely in my 18 research, in particular electron probe 19 microanalysis, because it is much more 20 accurate than EDS. 21 Q. And to what degree do you 22 routinely use these tools and techniques that 23 have been mentioned with reference to your 24 published papers? 25 A. So I strive to have 100 percent</p>

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<p>1 of the research I do culminate in the 2 publication of a paper in a peer-reviewed 3 journal. So all of these techniques are used 4 prominently in my 250 and counting 5 scientific, peer-reviewed papers. 6 Q. Tell us some of the 7 qualifications you have to critique 8 methodologies for detecting asbestos, in 9 particular. 10 A. So there's nothing special 11 about asbestos. It's a mineral. Amphibole 12 is amphibole, and the distinction between the 13 many different varieties and species in the 14 amphibole group are very minor. So there's 15 nothing particularly special about analyzing 16 these materials. They're just minerals. 17 Q. Do you have experience 18 analyzing amphiboles? 19 A. I think I've written at least 20 20 or 30 papers about amphiboles using many, 21 many different analytical techniques. 22 Q. What, if anything, is there 23 about asbestiform amphiboles that make them 24 more or less of a challenge in terms of 25 microscopy techniques that we've been talking</p>	<p>1 Q. Professor Dyar, of your 250 -- 2 you would agree with me 250-plus 3 peer-reviewed papers, right? 4 A. Correct. 5 Q. Not a one of them are addressed 6 to the subject of how to identify asbestos in 7 talcum powder, correct? 8 A. Correct. 9 Q. Not a one of them is on the 10 subject of how to identify asbestos in bulk 11 materials, correct? 12 A. Literally that is correct, but 13 let's remember that I use the techniques that 14 are used to identify asbestos in talc 15 routinely, and those are figured -- are 16 featured prominently in many of my papers. 17 Q. You've never published a 18 peer-reviewed paper where the subject of 19 paper is how to identify asbestos in any 20 substance, correct? 21 A. Correct. 22 Q. How much time do you spend in a 23 laboratory on an annual basis analyzing 24 materials to determine if they do or do not 25 contain asbestiform asbestos minerals?</p>
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<p>1 about today? 2 A. Nothing in particular. The 3 only challenge would be that sometimes the 4 particle sizes are too small to be resolved 5 with a polarizing light microscope, and you 6 might need to use other techniques in those 7 situations. 8 MR. CHACHKES: No further 9 questions. 10 REDIRECT EXAMINATION 11 QUESTIONS BY MR. FINCH: 12 Q. 251 peer-reviewed papers; is 13 that what you said, Doctor? 14 A. You know, that number changes 15 almost daily. I don't actually know what it 16 is right now. 17 Q. All right. Ballpark 300, plus 18 or minus? 19 A. Oh, it's definitely not 300. 20 I'm not that fast. 21 Q. Okay. And I apologize for 22 calling you Professor Darby Dyar. I will -- 23 I thought your name was Darby Dyar, so I 24 apologize for that, ma'am. 25 A. Thank you.</p>	<p>1 A. Very little, but I probably 2 spend 3,000 hours a year in a laboratory 3 using all of the same techniques that are 4 used to identify asbestos in talc. 5 Q. Very little. Is that less than 6 ten hours? 7 A. Probably. 8 MR. FINCH: No more questions. 9 MR. CHACHKES: That's it. 10 VIDEOGRAPHER: Okay. Stand by, 11 please. One second. Remove your 12 microphones. 13 The time is 6:45 p.m. This 14 completes today's deposition. 15 Off the record. 16 (Deposition concluded at 6:45 p.m.) 17 ----- 18 19 20 21 22 23 24 25</p>

Melinda Darby Dyar, Ph.D.

<p style="text-align: right;">Page 366</p> <p>1 CERTIFICATE</p> <p>2</p> <p>3 I, CARRIE A. CAMPBELL, Registered</p> <p>4 Diplomat Reporter, Certified Realtime</p> <p>5 Reporter and Certified Shorthand Reporter, do</p> <p>6 hereby certify that prior to the commencement</p> <p>7 of the examination, M. Darby Dyar, Ph.D. was</p> <p>8 duly sworn by me to testify to the truth, the</p> <p>9 whole truth and nothing but the truth.</p> <p>10 I DO FURTHER CERTIFY that the</p> <p>11 foregoing is a verbatim transcript of the</p> <p>12 testimony as taken stenographically by and</p> <p>13 before me at the time, place and on the date</p> <p>14 hereinbefore set forth, to the best of my</p> <p>15 ability.</p> <p>16</p> <p>17 I DO FURTHER CERTIFY that I am</p> <p>18 neither a relative nor employee nor attorney</p> <p>19 nor counsel of any of the parties to this</p> <p>20 action, and that I am neither a relative nor</p> <p>21 employee of such attorney or counsel, and</p> <p>22 that I am not financially interested in the</p> <p>23 action.</p> <p>24</p> <p>25</p> <p>_____ CARRIE A. CAMPBELL, NCRA Registered Diplomat Reporter Certified Realtime Reporter Notary Public Dated: April 3, 2019</p>	<p style="text-align: right;">Page 368</p> <p>1 ACKNOWLEDGMENT OF DEPONENT</p> <p>2</p> <p>3</p> <p>4 I, _____, do</p> <p>5 hereby certify that I have read the foregoing</p> <p>6 pages and that the same is a correct</p> <p>7 transcription of the answers given by me to</p> <p>8 the questions therein propounded, except for</p> <p>9 the corrections or changes in form or</p> <p>10 substance, if any, noted in the attached</p> <p>11 Errata Sheet.</p> <p>12</p> <p>13 _____ DATE</p> <p>14 M. Darby Dyar, Ph.D.</p> <p>15</p> <p>16 Subscribed and sworn to before me this</p> <p>17 _____ day of _____, 20 ____.</p> <p>18 My commission expires: _____</p> <p>19 Notary Public</p> <p>20</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p>
<p style="text-align: right;">Page 367</p> <p>1 INSTRUCTIONS TO WITNESS</p> <p>2</p> <p>3 Please read your deposition over</p> <p>4 carefully and make any necessary corrections.</p> <p>5 You should state the reason in the</p> <p>6 appropriate space on the errata sheet for any</p> <p>7 corrections that are made.</p> <p>8 After doing so, please sign the</p> <p>9 errata sheet and date it. You are signing</p> <p>10 same subject to the changes you have noted on</p> <p>11 the errata sheet, which will be attached to</p> <p>12 your deposition.</p> <p>13 It is imperative that you return</p> <p>14 the original errata sheet to the deposing</p> <p>15 attorney within thirty (30) days of receipt</p> <p>16 of the deposition transcript by you. If you</p> <p>17 fail to do so, the deposition transcript may</p> <p>18 be deemed to be accurate and may be used in</p> <p>19 court.</p> <p>20</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p>	<p style="text-align: right;">Page 369</p> <p>1 -----</p> <p>2 ERRATA</p> <p>3 -----</p> <p>4 PAGE LINE CHANGE/REASON</p> <p>5 _____</p> <p>6 _____</p> <p>7 _____</p> <p>8 _____</p> <p>9 _____</p> <p>10 _____</p> <p>11 _____</p> <p>12 _____</p> <p>13 _____</p> <p>14 _____</p> <p>15 _____</p> <p>16 _____</p> <p>17 _____</p> <p>18 _____</p> <p>19 _____</p> <p>20 _____</p> <p>21 _____</p> <p>22 _____</p> <p>23 _____</p> <p>24 _____</p> <p>25 _____</p>

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Exhibit B

1 UNITED STATES DISTRICT COURT
2 DISTRICT OF NEW JERSEY
3
4 -----X
5 IN RE JOHNSON & JOHNSON) MDL No.
6 TALCUM POWDER PRODUCTS) 16-2738 (FLW) (LHG)
7 MARKETING SALES PRACTICES,)
8 AND PRODUCTS LIABILITY)
9 LITIGATION)
10)
11 THIS DOCUMENT RELATES TO)
12 ALL CASES)

13 -----X

14
15 VIDEOTAPED DEPOSITION OF
16 ANN G. WYLIE, Ph.D.
17 WASHINGTON, D.C.
18 WEDNESDAY, MARCH 13, 2019
19 9:19 A.M.
20
21
22
23
24

25 Reported by: Leslie A. Todd

Ann G. Wylie, Ph.D.

Page 2	Page 4
<p>1 Deposition of ANN G. WYLIE, Ph.D., held at the</p> <p>2 offices of:</p> <p>3</p> <p>4</p> <p>5 SKADDEN, ARPS, SLATE, MEAGHER & FLOM, LLP</p> <p>6 1440 New York Avenue, Northwest</p> <p>7 Washington, D.C. 20005</p> <p>8 (202) 371-7105</p> <p>9</p> <p>10</p> <p>11</p> <p>12</p> <p>13</p> <p>14 Pursuant to notice, before Leslie Anne Todd,</p> <p>15 Court Reporter and Notary Public in and for the</p> <p>16 District of Columbia, who officiated in</p> <p>17 administering the oath to the witness.</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p>	<p>1 APPEARANCES (Continued):</p> <p>2</p> <p>3 NINA R. ROSE, ESQUIRE</p> <p>4 SKADDEN, ARPS, SLATE, MEAGHER & FLOM, LLP</p> <p>5 1440 New York Avenue, Northwest</p> <p>6 Washington, D.C. 20005</p> <p>7 (202) 371-7105</p> <p>8</p> <p>9 JOHN L. EWALD, ESQUIRE</p> <p>10 ORRICK, HERRINGTON & SUTCLIFFE LLP</p> <p>11 51 West 52nd Street</p> <p>12 New York, New York 10019-6142</p> <p>13 (212) 506-3792</p> <p>14</p> <p>15 ON BEHALF OF THE PCPC:</p> <p>16 THOMAS T. LOCKE, ESQUIRE</p> <p>17 SEYFARTH SHAW LLP</p> <p>18 975 F Street, NW</p> <p>19 Washington, D.C. 20004</p> <p>20 (202) 463-2400</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p>
Page 3	Page 5
<p>1 A P P E A R A N C E S</p> <p>2</p> <p>3 ON BEHALF OF THE PLAINTIFFS:</p> <p>4 CHRISTOPHER M. PLACITELLA, ESQUIRE</p> <p>5 COHEN PLACITELLA ROTH, PC</p> <p>6 127 Maple Avenue</p> <p>7 Red Bank, New Jersey 07701</p> <p>8 (888) 219-3599</p> <p>9</p> <p>10 LEIGH O'DELL, ESQUIRE</p> <p>11 JENNIFER K. EMMEL, ESQUIRE</p> <p>12 BEASLEY, ALLEN, CROW, METHVIN,</p> <p>13 PORTIS & MILES, P.C.</p> <p>14 218 Commerce Street</p> <p>15 Montgomery, Alabama 36103-4160</p> <p>16 (334) 269-2343</p> <p>17</p> <p>18 ON BEHALF OF THE JOHNSON & JOHNSON DEFENDANTS:</p> <p>19 JACK N. FROST, JR., ESQUIRE</p> <p>20 DRINKER, BIDDLE & REATH, LLP</p> <p>21 600 Campus Drive</p> <p>22 Florham Park, New Jersey 07932-1047</p> <p>23 (973) 549-7000</p> <p>24</p> <p>25</p>	<p>1 APPEARANCES (Continued):</p> <p>2</p> <p>3 ON BEHALF OF PHARMATECH INDUSTRIES (PTI):</p> <p>4 TARIQ M. NAEEM, ESQUIRE</p> <p>5 TUCKER ELLIS, LLP</p> <p>6 950 Main Avenue</p> <p>7 Suite 1100</p> <p>8 Cleveland, Ohio 44113-7213</p> <p>9 (216) 696-3675</p> <p>10</p> <p>11 ALSO PRESENT:</p> <p>12 DAVID EAGLEMAN, Ph.D.</p> <p>13 DANIEL HOLMSTOCK, Videographer</p> <p>14 ELIJAH JAMES, Videographer Assistant</p> <p>15</p> <p>16</p> <p>17</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p>

<p style="text-align: right;">Page 6</p> <p>1 C O N T E N T S</p> <p>2 EXAMINATION OF ANN G. WYLIE, Ph.D. PAGE</p> <p>3 By Mr. Placitella 11, 272, 287</p> <p>4 By Mr. Frost 253, 285</p> <p>5 E X H I B I T S</p> <p>6 (Attached to transcript)</p> <p>7 WYLIE DEPOSITION EXHIBITS PAGE</p> <p>8 No. AW-16 JNJTALC000300517 Metadata 168</p> <p>9 No. AW-17 Letter to Howard Wensley from</p> <p>10 Ann G. Wylie, dated November 7,</p> <p>11 1986 164</p> <p>12 No. AW-31 Article entitled "The Importance</p> <p>13 of Width in Asbestos Fiber</p> <p>14 Carcinogenicity and Its</p> <p>15 Implications for Public Policy,"</p> <p>16 Bates BOL044220 to 044233 188</p> <p>17 No. AW-35 IMERYS446869 Metadata 199</p> <p>18 No. AW-36 Curriculum Vitae of Ann Wylie</p> <p>19 (retained by counsel) 19</p> <p>20 No. AW-40 1985 Report by Dr. Wylie for</p> <p>21 R.T. Vanderbilt (retained by</p> <p>22 counsel) 175</p> <p>23 No. AW-44 Expert Report of Ann G. Wylie,</p> <p>24 Ph.D. for General Causation</p> <p>25 Daubert Hearing, dated 2/25/19 40</p>	<p style="text-align: right;">Page 8</p> <p>1 OTHER EXHIBITS USED</p> <p>2 J&J-65 Examination for Talc Samples</p> <p>3 Argonaut Ore Body, Report by</p> <p>4 Vernon Zeitz, 24 April 1974 71</p> <p>5 J&J-89 Letter to Vern Zeitz from Gene</p> <p>6 Grieger, dated 1 July 1975 74</p> <p>7 J&J-97 Report of Investigation of</p> <p>8 Italian Mine Samples and</p> <p>9 Related Powders 100</p> <p>10 J&J-179 Letter to Roger Miller from</p> <p>11 Mark Palenik, dated 2 November</p> <p>12 1984 80</p> <p>13 J&J-188 Stipulation of Dismissal from</p> <p>14 Edley vs. E&B Mill Supply case,</p> <p>15 July 23, 1987 62</p> <p>16 J&J-202 Interoffice Correspondence</p> <p>17 Re Cyprus Ore Reserves -</p> <p>18 Arsenic & Tremolite, March 25,</p> <p>19 1992 85</p> <p>20 Hopkins-28 Spreadsheet 100</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p>
<p style="text-align: right;">Page 7</p> <p>1 E X H I B I T S (Continued)</p> <p>2 (Attached to transcript)</p> <p>3 WYLIE DEPOSITION EXHIBITS PAGE</p> <p>4 No. AW-50 Pad of paper with notes</p> <p>5 made at deposition 158</p> <p>6 No. AW-50A Handwritten document 244</p> <p>7 No. AW-51 Department of Mineral Exploration</p> <p>8 Report of Italian Mine Samples</p> <p>9 J&J, Bates FDP000000495 to</p> <p>10 000000615 100</p> <p>11 No. AW-52 Supplemental List of References</p> <p>12 for Ann Wylie, PhD 252</p> <p>13 No. AW-53 Curriculum Vitae of Ann Gilbert</p> <p>14 Wylie 235</p> <p>15 No. AW-54 Letter to Honorable Barbara</p> <p>16 Boxer from Ann G. Wylie, dated</p> <p>17 June 16, 2007 255</p> <p>18 No. AW-55 EPA Test Method document,</p> <p>19 Interim Method for the</p> <p>20 Determination of Asbestos in</p> <p>21 Bulk Insulation Samples,</p> <p>22 December 1982 264</p> <p>23 No. AW-56 Deposition transcript of</p> <p>24 Frederick Pooley, Ph.D. taken on</p> <p>25 February 1, 2018 267</p>	<p style="text-align: right;">Page 9</p> <p>1 P R O C E E D I N G S</p> <p>2 -----</p> <p>3 MR. FROST: I just want to note for</p> <p>4 the record that plaintiffs' counsel have brought</p> <p>5 David Eagleman to this deposition today.</p> <p>6 Dr. Eagleman is not an attorney for any of the</p> <p>7 parties here; therefore, he does not have a right</p> <p>8 under Section (1)(b)(3) of CMO-11 to attend.</p> <p>9 When we learned about Dr. Eagleman</p> <p>10 coming last night, and we -- "we" being the</p> <p>11 Johnson & Johnson defendants -- objected to his</p> <p>12 presence at this deposition as no application has</p> <p>13 been made per the terms of the Case Management</p> <p>14 Order.</p> <p>15 And that said, without waiving our</p> <p>16 rights to object in the future, we're going to</p> <p>17 allow him to stay for now. If he becomes</p> <p>18 disruptive in any way or if he in any way affects</p> <p>19 the proceedings, we will seek to enforce CMO-11,</p> <p>20 and we will seek to have him, you know, no longer</p> <p>21 admitted to the deposition.</p> <p>22 Finally, I have asked plaintiffs'</p> <p>23 counsel to forward a copy of the confidentiality</p> <p>24 order that Dr. Eagleman -- that Dr. Eagleman</p> <p>25 previously signed. If we can't find it, we'll</p>

<p style="text-align: right;">Page 10</p> <p>1 have him execute another one, but that is 2 certainly one of the terms by which we will 3 require that he stays here. 4 MR. PLACITELLA: So I was there when 5 Dr. Eagleman signed the first time with Mr. Bicks 6 at the Hopkins deposition. Hopefully -- I know 7 that Dr. Eagleman has been asked to leave parties 8 that are a lot more fun than this one. So, 9 hopefully, we will never get to that. 10 MR. FROST: I'm not too worried. I 11 mean, based on the representation of counsel, I'm 12 sure there's one signed. If not, we can always 13 execute a new one today if we need to. 14 That said, we can begin. 15 THE VIDEOGRAPHER: All right. Everybody 16 ready? 17 MR. LOCKE: Actually, one more thing. 18 Tom Locke for the Personal Care Products Council. 19 We did not get notice of Dr. Eagleman's 20 participation. We join in Johnson & Johnson's 21 objection, but more importantly, we would just 22 like to get notice of what's happening with these 23 depositions before the deposition. 24 That's it. 25 THE VIDEOGRAPHER: We are now on the</p>	<p style="text-align: right;">Page 12</p> <p>1 Q My son told me to be nice to you and 2 told me to wear the Terps scarf, because he spent 3 some of his best years there, but I thought that 4 might be a little over the top. 5 So today I plan on covering four areas: 6 Your background, your area of expertise, the 7 methodology that you used in coming to your 8 opinions in this case, and the information and 9 data that form the basis of your opinions. 10 Got that? 11 A I do. 12 Q Okay. We're on the same page? 13 A That will be fine. 14 Q Okay. First, I want to start with your 15 affiliation with Johnson & Johnson. When is the 16 first work you ever did with Johnson & Johnson on 17 issues related to talc? 18 A This involve -- this litigation. The 19 first, this litigation. 20 Q When you say "this litigation," what do 21 you mean by that? 22 A I was retained to review the documents 23 and provide a report. That's the first time I've 24 worked for Johnson & Johnson. 25 Q And when were you retained?</p>
<p style="text-align: right;">Page 11</p> <p>1 record. My name is Daniel Holmstock. I am the 2 videographer for Golkow Litigation Services. 3 Today's date is March 13th, 2019, and the time on 4 the video screen is 9:19 a.m. 5 This video deposition is being held at 6 Skadden Arps, 1440 New York Avenue, Northwest, in 7 Washington, D.C., in the matter of In Re: Johnson 8 & Johnson Talcum Powder Products Marketing, Sales 9 Practices and Products Liability Litigation, MDL 10 No. 2738, pending before the United States 11 District Court for the Eastern District of New 12 Jersey. 13 The deponent today is Dr. Ann Wylie. 14 Counsel for appearances will be noted on 15 the stenographic record. 16 The court reporter is Leslie Todd, who 17 will now administer the oath to the witness. 18 ANN WYLIE, Ph.D., 19 and having been first duly sworn, 20 was examined and testified as follows: 21 DIRECT EXAMINATION 22 BY MR. PLACITELLA: 23 Q Good morning, Dr. Wylie. I'm Chris 24 Placitella. How are you? 25 A I'm fine. Thank you.</p>	<p style="text-align: right;">Page 13</p> <p>1 A Let's see. I -- I think Mr. Frost came 2 to see me sometime in November of 2018, and I 3 think I agreed to do it at the end of November, 4 early December 2018. 5 Q Okay. So prior to being -- that's when 6 you were retained by Johnson & Johnson? 7 A Yes. 8 Q Okay. And what were the terms of your 9 retainer? 10 A I'm sorry. Could you be more specific, 11 the terms? 12 Q Sure. Yeah. What were the conditions 13 of your -- were there any conditions of -- of your 14 being retained? Did you have any conditions? 15 A Well, the scope of work was outlined, 16 and I agreed to a particular scope of work. 17 Q And what was that? 18 A That I would review the literature on 19 the deposits that had been used by Johnson & 20 Johnson, Italy and Vermont, and that I would 21 review the reports that were provided by 22 Drs. Longo and Rigler. 23 Q Okay. Now, is that the first time you 24 ever actually worked with anyone at Johnson & 25 Johnson on the issues related to talc?</p>

<p style="text-align: right;">Page 14</p> <p>1 A Yes.</p> <p>2 Q Now, I'm not talking about being paid by</p> <p>3 Johnson & Johnson. I'm asking specifically, was</p> <p>4 that the first interaction you had with anyone at</p> <p>5 Johnson & Johnson related to talc?</p> <p>6 A Yes.</p> <p>7 Q Okay. And November 2018 was the first</p> <p>8 consult you had with Johnson & Johnson for</p> <p>9 litigation purposes --</p> <p>10 A That would be --</p> <p>11 Q -- correct?</p> <p>12 A Yes.</p> <p>13 Q Did Johnson & Johnson ever pay -- pay</p> <p>14 for you to attend any meetings with any government</p> <p>15 agencies?</p> <p>16 A No.</p> <p>17 Q Did they ever fund your expenses to</p> <p>18 attend any meetings with government agencies?</p> <p>19 A No.</p> <p>20 Q You attended an FDA workshop in November</p> <p>21 2018?</p> <p>22 A That's correct.</p> <p>23 Q Okay. And did you have any interaction</p> <p>24 with Johnson & Johnson related to that workshop?</p> <p>25 A No.</p>	<p style="text-align: right;">Page 16</p> <p>1 A No.</p> <p>2 Q Did you ever work on any committees</p> <p>3 dealing with talc or asbestos with respect for</p> <p>4 the AS -- with respect to the ASTM?</p> <p>5 A Well, within the last three years I'm on</p> <p>6 this committee, and there are -- there are</p> <p>7 methods, draft methods that revolve around</p> <p>8 identification of materials in talc, and that's</p> <p>9 the ongoing business of the committee.</p> <p>10 Q Okay. And are there any members of</p> <p>11 Johnson & Johnson on that committee with you?</p> <p>12 A I don't know.</p> <p>13 Q Now, you are -- your degree is in</p> <p>14 geology?</p> <p>15 A Yes.</p> <p>16 Q And you have a Ph.D. in geology?</p> <p>17 A Yes.</p> <p>18 Q Okay. And the year you got your Ph.D.</p> <p>19 is?</p> <p>20 A 1972.</p> <p>21 Q And from where?</p> <p>22 A Columbia University.</p> <p>23 Q Okay. And you're not an epidemiologist,</p> <p>24 correct?</p> <p>25 A No.</p>
<p style="text-align: right;">Page 15</p> <p>1 Q So you had no contact with Johnson &</p> <p>2 Johnson at all related to that workshop.</p> <p>3 A No.</p> <p>4 Q Do you know who William Ashton is?</p> <p>5 A No.</p> <p>6 Q Do you have any -- did you ever work</p> <p>7 with William Ashton?</p> <p>8 A No.</p> <p>9 Q Did you ever do any work for the -- the</p> <p>10 Cosmetics Trade Association?</p> <p>11 A No.</p> <p>12 Q Okay. I understand that you did do work</p> <p>13 with respect to ASTM, correct?</p> <p>14 A Do work with respect -- I'm a member of</p> <p>15 D22.</p> <p>16 Q Right. And how long have you been a</p> <p>17 member?</p> <p>18 A About three years.</p> <p>19 Q Three years?</p> <p>20 A Mm-hmm.</p> <p>21 Q And D22 meaning what?</p> <p>22 A That's the -- a committee that deals</p> <p>23 with issues around asbestos.</p> <p>24 Q Okay. Did you ever do any work with</p> <p>25 ASTM related to talc other than on just asbestos?</p>	<p style="text-align: right;">Page 17</p> <p>1 Q Okay. You're not an expert in</p> <p>2 biological activity of substances' effect on the</p> <p>3 human body?</p> <p>4 A No.</p> <p>5 Q You're not a toxicologist?</p> <p>6 A No.</p> <p>7 Q Okay. You have no medical degree?</p> <p>8 A No.</p> <p>9 Q Okay. You've never performed any animal</p> <p>10 studies yourself?</p> <p>11 A No.</p> <p>12 Q Okay. You have no pathology experience,</p> <p>13 correct?</p> <p>14 A No training, no.</p> <p>15 Q Okay. When is the last ongoing research</p> <p>16 that you did as a geologist?</p> <p>17 A I have ongoing research now.</p> <p>18 Q In what capacity? Doing what?</p> <p>19 A I'm interested in the characteristics of</p> <p>20 mineral dust that are known to cause mesothelioma</p> <p>21 in particular.</p> <p>22 Q Okay.</p> <p>23 A And why the incidence of mesothelioma</p> <p>24 among exposed populations varies.</p> <p>25 Q Tell me if you agree or disagree with</p>

<p style="text-align: right;">Page 18</p> <p>1 this statement. Do you consider yourself, by the 2 way, a job -- an earth scientist? 3 A That's a general term for a geologist. 4 Q Okay. Do you agree with the statement 5 that a job of earth scientist is not to decide 6 what is toxic, but to assist the health committee 7 and regulators -- health community and regulators 8 by carefully describing the physical and chemical 9 properties of natural materials? 10 MR. FROST: Objection to form. 11 THE WITNESS: I think I would agree with 12 that. 13 MR. PLACITELLA: Okay. Now, can we go 14 to -- 15 (Counsel conferring.) 16 MR. FROST: So, Chris, I take it this 17 screen in front of Dr. Wylie is -- 18 MR. PLACITELLA: Mm-hmm. 19 MR. FROST: -- what's projected up 20 there? Can you see the screen, Doctor? Is that 21 big enough? 22 THE WITNESS: If I get very close. 23 MR. FROST: It seems very tiny. 24 MR. PLACITELLA: I'll blow things up for 25 you.</p>	<p style="text-align: right;">Page 20</p> <p>1 Q But you did work with them. 2 A I submitted a paper to this publication. 3 Q Okay. 4 A So I -- I wouldn't have interpreted your 5 question working with them to assume that a 6 publisher was working with them. 7 Q Well, you attended their conference? 8 A I -- I'm sorry, what conference? 9 Q Do you recall ever attending any 10 conferences for the ASTM more than -- 11 A I remember -- 12 Q -- three years ago? 13 A I remember presenting this paper. 14 Q Okay. 15 A So, perhaps, but I didn't recollect it. 16 Q Okay. And in -- in your section 17 there is a -- or in your resume there's a section 18 on consulting. 19 A Yes. 20 Q Do you see that? 21 A Yes, uh-huh. 22 Q And it says that you consulted Avon 23 Products in 1973. 24 A That's correct. 25 Q And what was your consultation with Avon</p>
<p style="text-align: right;">Page 19</p> <p>1 THE WITNESS: Okay. 2 (Wylie Exhibit No. AW-36 was 3 marked for identification.) 4 BY MR. PLACITELLA: 5 Q What I'm describing to you is -- I have 6 it marked AW-36, and I'll have a copy made at the 7 break because I got this late last night. This is 8 your curriculum vitae signed in January, it looks 9 like 1989. Is that your signature? 10 A It is. 11 Q Okay. And I just want to go through 12 with you your curriculum vitae. 13 In your curriculum vitae, it -- you have 14 listed a publication that you did for the American 15 Society of Testing and Materials. 16 Is that fair? 17 A Yes. 18 Q Okay. 19 A They published it, yes. 20 Q All right. So you did have some 21 affiliation with the ASTM before three years ago. 22 A That -- as I recollect, I was invited by 23 whoever was organizing this particular volume to 24 contribute, but I wasn't a member of ASTM at that 25 time.</p>	<p style="text-align: right;">Page 21</p> <p>1 Products in 1973? 2 A There was a new method being developed 3 for identification of fiber in talc, and they 4 asked me to review the methodology. 5 Q And Avon Products was a company that 6 sold talc-containing products? 7 A I -- I -- I think so. 8 Q Okay. You also have here consulting 9 with R.T. Vanderbilt Company, and the first year 10 you have listed is 1977, and the last year you 11 have listed here is 1987. Do you see that? 12 A Yes. 13 Q Have you consulted for R.T. Vanderbilt 14 after 1987? 15 A I have done some mineral analysis for 16 them post this time. 17 Q Okay. 18 A And I gave a deposition for them, I 19 think post this time. 20 Q Okay. And in working for R.T. 21 Vanderbilt, did you work on them -- work for them 22 in the context of litigation related to the talc 23 that they sold? 24 A I gave a deposition in a -- once for 25 that purpose.</p>

<p style="text-align: right;">Page 22</p> <p>1 Q Okay. And did you issue reports for 2 R.T. Vanderbilt that were litigation related? 3 A I did mineral analysis for them. 4 I don't believe that I knew whether they 5 were litigation related or not. But one of them 6 when they -- when the deposition was taken, 7 certainly those reports were part of that 8 litigation at that time. 9 Q Okay. And you have listed here, and I 10 have highlighted it, "Desert Mineral Products, 11 1979." That's a company that sold talc, correct? 12 A Yes. 13 Q And what work did you do for Desert 14 Mineral Products in 1979? 15 A I analyzed some samples of talc. 16 Q And did that in any way relate to 17 litigation? 18 A It related to an administrative hearing 19 in California. 20 Q Okay. Next you have listed United 21 States Mineral Products, 1981. Do you see that? 22 A Yes. 23 Q That was a company that sold asbestos- 24 containing fireproofing? 25 A I really don't remem- -- I don't know</p>	<p style="text-align: right;">Page 24</p> <p>1 A I assume I analyzed a sample. 2 Q Okay. Well, when you put this resume 3 together, what was the foundation for what you 4 were listing? 5 MR. FROST: Objection to form. 6 BY MR. PLACITELLA: 7 Q What did -- what records did you look 8 at? 9 MR. FROST: Objection to form. 10 THE WITNESS: I -- I don't remember. 11 BY MR. PLACITELLA: 12 Q Okay. 13 A Whatever -- I don't remember. 14 Q Do you know whether you did -- the work 15 that you did for Celotex Corporation was related 16 to litigation? 17 A I don't think so. I don't remember. My 18 work for any of these was primarily mineral 19 analysis. It was not litigation. 20 Q Okay. And it says -- the next one you 21 list is GAF Corporation, 1986. Do you see that? 22 A Yes. 23 Q Do you understand that they manufactured 24 asbestos-containing products? 25 MR. FROST: Objection to form.</p>
<p style="text-align: right;">Page 23</p> <p>1 that. 2 Q Do you remember they were from Stanhope, 3 New Jersey? 4 MR. FROST: Objection to form. 5 THE WITNESS: No. 6 BY MR. PLACITELLA: 7 Q Do you ever remember dealing with a man 8 name -- named Jim Verhalen? 9 A No. 10 Q Okay. Do you remember what you did for 11 United States Mineral Products in 1981? 12 A I -- I must have analyzed a sample. 13 Q What kind of samples? 14 A I have absolutely no recollection. 15 Q You have listed here Celotex 16 Corporation, 1986 and 1987. Do you see that? 17 A Yes. 18 Q Celotex Corporation was a company that 19 manufactured asbestos-containing products, 20 correct? 21 MR. FROST: Objection to form. 22 THE WITNESS: I don't know that. 23 BY MR. PLACITELLA: 24 Q What work did you do for Celotex in 1986 25 and 1987?</p>	<p style="text-align: right;">Page 25</p> <p>1 THE WITNESS: I don't believe I know 2 that. 3 BY MR. PLACITELLA: 4 Q Did you know that they owned an asbestos 5 mine? 6 MR. FROST: Objection to form. 7 THE WITNESS: No. 8 BY MR. PLACITELLA: 9 Q Okay. Did you know that they owned an 10 asbestos mine in the state of Vermont? 11 MR. FROST: Objection to form. 12 THE WITNESS: I did not. 13 BY MR. PLACITELLA: 14 Q Okay. Do you know what work you did for 15 GAF Corporation? 16 A As I indicated before, the only work I 17 did was -- in general, would be to analyze a 18 sample for asbestos. 19 Q So they would give a sample of their 20 product to you and ask you to analyze it? 21 A I have no idea what they gave me, 22 frankly. 23 Q Next you have listed Keene Corporation, 24 1986 and 1987. Do you know that they were a 25 manufacturer of asbestos-containing products?</p>

<p style="text-align: right;">Page 26</p> <p>1 A No.</p> <p>2 MR. FROST: Objection to form.</p> <p>3 THE WITNESS: No.</p> <p>4 BY MR. PLACITELLA:</p> <p>5 Q Okay. And do you know what work you did</p> <p>6 for Keene Corporation?</p> <p>7 A The only work I did for any of these,</p> <p>8 it's been a long time, is an analysis of samples</p> <p>9 for the presence of asbestos.</p> <p>10 Q The next one I have highlighted here is</p> <p>11 Southern Talc. That was a manufacturer and seller</p> <p>12 of talc, correct?</p> <p>13 MR. FROST: Objection to form.</p> <p>14 THE WITNESS: Yes.</p> <p>15 BY MR. PLACITELLA:</p> <p>16 Q Okay. And what did you do for them?</p> <p>17 A I did analysis of samples that they sent</p> <p>18 me for the presence of asbestos.</p> <p>19 Q Okay. And did you do an analysis --</p> <p>20 when you did your -- when you said you did</p> <p>21 analysis for Celotex, GAF and Keene, was that all</p> <p>22 for the presence of asbestos?</p> <p>23 MR. FROST: Objection to form.</p> <p>24 THE WITNESS: To the best of my</p> <p>25 recollection.</p>	<p style="text-align: right;">Page 28</p> <p>1 the candidate. So they -- they request letters,</p> <p>2 and the letters come in, and the candidate does</p> <p>3 not necessarily know who was invited to provide</p> <p>4 letters.</p> <p>5 Q But as you sit here today, do you know</p> <p>6 that R.T. Vanderbilt actually wrote to the</p> <p>7 University of Maryland in support of your tenure?</p> <p>8 MR. FROST: Objection to form.</p> <p>9 THE WITNESS: Someone told me that</p> <p>10 sometime ago, but I actually only learned of it</p> <p>11 recently.</p> <p>12 BY MR. PLACITELLA:</p> <p>13 Q And how did you learn of it?</p> <p>14 A Someone -- someone told me who had been</p> <p>15 in a case somewhere, and I can't remember exactly</p> <p>16 who told me. I -- or why it was even a subject of</p> <p>17 discussion since I wasn't involved, and I think</p> <p>18 that was the reason why they told this subject had</p> <p>19 come up.</p> <p>20 Q Who was the chairman -- your chairman at</p> <p>21 the time when you secured tenure at the University</p> <p>22 of Maryland?</p> <p>23 A Galt Siegrist.</p> <p>24 Q And are you aware that your chairman</p> <p>25 actually wrote to R.T. Vanderbilt and advised them</p>
<p style="text-align: right;">Page 27</p> <p>1 BY MR. PLACITELLA:</p> <p>2 Q Okay. And when people hire you, do you</p> <p>3 ever ask them what the nature of their business</p> <p>4 is?</p> <p>5 A No.</p> <p>6 Q Okay. I noticed in your current CV that</p> <p>7 U.S. Mineral, Celotex, GAF and Keene are no longer</p> <p>8 on your CV; is that correct?</p> <p>9 A That's correct.</p> <p>10 Q Why is that?</p> <p>11 A The academic -- the form of the</p> <p>12 university's CVs don't ask for consulting, and</p> <p>13 this is my university CV.</p> <p>14 Q Okay. Did R.T. Vanderbilt play a role</p> <p>15 in your securing tenure at the University of</p> <p>16 Maryland?</p> <p>17 MR. FROST: Objection.</p> <p>18 THE WITNESS: No.</p> <p>19 BY MR. PLACITELLA:</p> <p>20 Q Did R.T. Vanderbilt write a letter in</p> <p>21 support of your tenure at the University of</p> <p>22 Maryland?</p> <p>23 A The promotion and tenure process at the</p> <p>24 University of Maryland requests letters</p> <p>25 anonymously. They don't tell me. They don't tell</p>	<p style="text-align: right;">Page 29</p> <p>1 that their recommendation, quote, will constitute</p> <p>2 the most important document to be used in the</p> <p>3 entire promotion and tenure process?</p> <p>4 MR. FROST: Objection to form.</p> <p>5 BY MR. PLACITELLA:</p> <p>6 Q Are you aware of that?</p> <p>7 A No.</p> <p>8 Q You never heard that before?</p> <p>9 A No.</p> <p>10 Q Am I correct that R.T. Vanderbilt has</p> <p>11 funded graduate student research for your</p> <p>12 department?</p> <p>13 A Yes.</p> <p>14 Q And they've funded that in excess of a</p> <p>15 half a million dollars?</p> <p>16 A No.</p> <p>17 Q Do you ever recall testifying in the</p> <p>18 Westin case?</p> <p>19 A That -- the name doesn't ring any bells,</p> <p>20 so...</p> <p>21 Q Do you ever recall -- did you -- have</p> <p>22 you ever learned that R.T. Vanderbilt funded your</p> <p>23 student research for over \$500,000? You never</p> <p>24 heard that before?</p> <p>25 A That's simply not the case.</p>

<p style="text-align: right;">Page 30</p> <p>1 Q Okay. Did you ever appear in a film for 2 R.T. Vanderbilt that was used for Vanderbilt's 3 lobbying purposes? 4 MR. FROST: Objection to form. 5 THE WITNESS: I did appear in a film for 6 them. 7 BY MR. PLACITELLA: 8 Q And that was used for lobbying by them? 9 A I don't know. 10 Q And have you ever received research 11 grants from Southern Talc Company? 12 A Yes. 13 Q Okay. And -- 14 A One. 15 Q In excess of \$17,000? 16 A That would be correct. 17 Q Have you ever seen -- received research 18 grants from Ford Motor -- General Motor and 19 Chrysler? 20 A Yes. 21 Q Okay. And you know that they made 22 asbestos-containing products, correct? 23 MR. FROST: Objection to form. 24 THE WITNESS: I didn't know they made 25 them.</p>	<p style="text-align: right;">Page 32</p> <p>1 Q Right. And -- and you denied that you 2 had any connection or any ties or did any work for 3 any asbestos-containing product manufacturer, 4 correct? 5 A No. 6 MR. FROST: Objection to form. 7 THE WITNESS: The -- the question -- let 8 me go back. 9 The hearing was about a banned asbestos 10 bill, and I testified on that bill. I didn't 11 testify against the bill. In fact, I would be in 12 favor of such a bill. 13 I testified to ask the Senate to expand 14 the definitions of "asbestos," include more 15 minerals than are currently in the regulatory 16 policy and identification, because I thought that 17 there were other forms of amphibole that form 18 asbestos and should have been included in the law. 19 So that was the one point that I made. 20 And the other point was that we needed 21 definitions that would enable us to discriminate 22 asbestos from non-asbestos forms of the same 23 mineral, and I urged them to do so. 24 MR. PLACITELLA: Respectfully, ma'am, I 25 move to strike your testimony.</p>
<p style="text-align: right;">Page 31</p> <p>1 BY MR. PLACITELLA: 2 Q Okay. You didn't know they made 3 asbestos-containing brakes? 4 A I thought they used them. I didn't know 5 they made them. 6 Q Okay. And did the research grants that 7 you received from the automotive industry total 8 somewhere in excess of a half a million dollars? 9 A It did, yes. 10 Q Now, you have been, I know, asked and 11 you have testified before Congress on more than 12 one occasion, correct? 13 A Once only, I think. 14 Q And you testified before a Senate 15 Committee? 16 A That would be correct, yes. 17 Q Okay. During your testimony before the 18 Senate Committee, did -- did members of the Senate 19 raise concerns with the statements you were 20 providing to them concerning your ties to 21 industry? 22 MR. FROST: Objection to form. 23 THE WITNESS: That one senator did ask a 24 question of me about my ties to industry. 25 BY MR. PLACITELLA:</p>	<p style="text-align: right;">Page 33</p> <p>1 BY MR. PLACITELLA: 2 Q What was my question? 3 A I'm not exactly sure. 4 Q Okay. Well, let me show you your 5 testimony. 6 A All right. 7 Q Okay? You were asked: "Have you worked 8 for businesses that make money selling products 9 that may have caused disease associated with 10 asbestos?" 11 Do you see that? 12 A Yes. 13 MR. FROST: I'm going to object to the 14 form on this one. This doesn't look like an 15 official transcript from the Senate hearing. 16 MR. PLACITELLA: Well, if you have the 17 official one, I'm happy to put it up. Or if you 18 think somehow it's misstatement -- a misstatement, 19 I'm happy to correct it. 20 MR. FROST: I'm just preserving for the 21 record. 22 MR. PLACITELLA: That's fine. 23 MR. FROST: I have no ability at this 24 time -- 25 MR. PLACITELLA: Okay.</p>

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1 MR. FROST: -- to verify that, but this
 2 certainty does not look like a transcript that
 3 would have been generated by the United States
 4 government.
 5 MR. PLACITELLA: Okay.
 6 BY MR. PLACITELLA:
 7 Q And your answer was: "No."
 8 And the senator said: "Well, I have a
 9 number of receipts that show you've worked as a
 10 paid defense witnesses -- witness for businesses
 11 in asbestos litigation, and I must consent that
 12 these documents be put into the record, minding
 13 you answer my question honestly."
 14 Do you remember what year this testimony
 15 was, by the way?
 16 A Sometime around 2003 or something like
 17 that.
 18 Q And it says: "I did. I've never worked
 19 for an asbestos manufacturer."
 20 And you said -- and then the question
 21 was: "I didn't say that."
 22 And you said: "Or an asbestos
 23 fabricator."
 24 And the question was: "I didn't ask you
 25 that. I said, Have you ever worked as a paid

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1 defense witness for a business in asbestos
 2 litigation?"
 3 Your answer is: "I have testified on --
 4 on or about three occasions for, uh, on the nature
 5 of materials involved."
 6 And you wrote -- and the question was:
 7 "Who paid you?"
 8 Answer: "R.T. Vanderbilt, three times
 9 or thereabouts."
 10 Senator: "So your original answer was
 11 incorrect?"
 12 You said: "I -- I misunderstood."
 13 And the senator said: "Okay. Well, let
 14 me be clear, I think it's very important that we
 15 determine before this committee" --
 16 And you said: "I agree."
 17 Now, what I want to do is focus on
 18 your -- your testimony a little further up where
 19 it says: "I -- I did. I never worked for an
 20 asbestos manufacturer or an asbestos fabricator."
 21 Do you see that?
 22 A Yes.
 23 Q Okay. When you gave that testimony, you
 24 had already worked for United States Mineral
 25 Corporation, Celotex Corporation, GAF Corporation,

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1 and Keene Corporation, correct?
 2 A Yes.
 3 Q And when you gave that testimony, you
 4 had all -- you had actually put that on your CV,
 5 correct?
 6 A Yes.
 7 Q Okay. Now, let me ask you, focusing on
 8 your methodology in this case, tell -- tell me
 9 what methodology you used or you employed in
 10 arriving at your opinions in this case.
 11 MR. PLACITELLA: Can you get me the
 12 ELMO?
 13 THE VIDEOGRAPHER: Sure.
 14 THE WITNESS: In -- in this --
 15 BY MR. PLACITELLA:
 16 Q Yes, ma'am, in this case.
 17 A Okay. All right.
 18 Q And I -- I'm going to write it down so
 19 we have it. Okay?
 20 A What methodologies? I reviewed the
 21 literature, I did a literature search.
 22 Q Okay. Hold on. Okay. Reviewed
 23 literature.
 24 A Mm-hmm. And I reviewed the reports by
 25 MAS, Longo's and Rigler's reports.

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1 Q Anything else?
 2 A I don't think so, no.
 3 Q Okay. So your methodology --
 4 A I also reviewed two reports that were
 5 not published literature by Dr. Pooley and
 6 associates on the -- his reports on the mines in
 7 Vermont and in Italy. So that --
 8 Q Okay. So, one, you reviewed literature.
 9 Two, you reviewed reports of Longo?
 10 A Yes.
 11 Q And, three, you reviewed unpublished
 12 reports of Dr. Pooley. Correct?
 13 A That's correct.
 14 Q Okay. And where did you get those?
 15 A From Mr. Frost.
 16 Q So they came from Mr. Frost?
 17 A Yes.
 18 Q Okay. Anything else?
 19 A No.
 20 Q So I'm just going to write here,
 21 "Nothing else."
 22 MR. FROST: Objection to form.
 23 BY MR. PLACITELLA:
 24 Q Okay. Now, did you do any testing
 25 related to Johnson & Johnson products?

<p style="text-align: right;">Page 38</p> <p>1 A No.</p> <p>2 Q Okay. Did you request to do any testing</p> <p>3 related to Johnson & Johnson products?</p> <p>4 A No.</p> <p>5 Q Okay. Did you review any internal</p> <p>6 testing done by Johnson & Johnson of its</p> <p>7 talc-related products?</p> <p>8 A No.</p> <p>9 Q Did you ask to review any internal</p> <p>10 testing done by Johnson & Johnson of its talc-</p> <p>11 related products? And what I mean testing, I mean</p> <p>12 for asbestos.</p> <p>13 A No.</p> <p>14 Q Okay. You said that you reviewed the</p> <p>15 literature. How did you do that? The published</p> <p>16 literature.</p> <p>17 A Yes. I had literature, which I looked</p> <p>18 at. I did a search on GeoRef, which is a database</p> <p>19 for geological information.</p> <p>20 Q Okay. I noticed from looking at your</p> <p>21 report that you also searched the internet for</p> <p>22 pictures.</p> <p>23 A Yes.</p> <p>24 Q All right. So you downloaded some</p> <p>25 photos from the internet.</p>	<p style="text-align: right;">Page 40</p> <p>1 whether the opinions that you were giving in this</p> <p>2 case agree or disagree with Johnson & Johnson's</p> <p>3 own scientists?</p> <p>4 A No.</p> <p>5 Q Did you make an effort to determine</p> <p>6 whether the opinions you were giving in this case</p> <p>7 agree or disagree with other experts hired by</p> <p>8 Johnson & Johnson?</p> <p>9 A No.</p> <p>10 Q Okay. Now, I looked at your report,</p> <p>11 which -- do you have a copy with you?</p> <p>12 A I do.</p> <p>13 (Wylie Exhibit No. AW-44 was</p> <p>14 marked for identification.)</p> <p>15 BY MR. PLACITELLA:</p> <p>16 Q Okay. When I looked at your report --</p> <p>17 which I have marked here as AW-44 -- do you see</p> <p>18 that?</p> <p>19 A Yes.</p> <p>20 Q Okay. And when I look at the first 20</p> <p>21 pages of your report, I could only find four</p> <p>22 references to studies in your report that were</p> <p>23 done by somebody other than yourself. Is that</p> <p>24 accurate?</p> <p>25 MR. FROST: Objection to form.</p>
<p style="text-align: right;">Page 39</p> <p>1 A From the United States Geological</p> <p>2 Survey, yes.</p> <p>3 Q Okay. Am I correct that you didn't</p> <p>4 review any internal testing of sources of</p> <p>5 Johnson & Johnson talc other than the two Pooley</p> <p>6 reports given to you by Mr. Frost?</p> <p>7 A That's --</p> <p>8 MR. FROST: Objection to form.</p> <p>9 THE WITNESS: That is correct.</p> <p>10 BY MR. PLACITELLA:</p> <p>11 Q Did you ask Mr. Frost whether he had</p> <p>12 supplied you with all of the relevant internal</p> <p>13 testing of the Johnson & Johnson sourced mines?</p> <p>14 MR. FROST: Objection to form.</p> <p>15 THE WITNESS: I asked if there were any</p> <p>16 descriptions of the ore deposits themselves, but I</p> <p>17 did not ask for reports of product testing.</p> <p>18 BY MR. PLACITELLA:</p> <p>19 Q What about of the mine reports for</p> <p>20 asbestos in the mines, did you ask for that?</p> <p>21 A No.</p> <p>22 Q Did you speak to any of the scientists</p> <p>23 at Johnson & Johnson?</p> <p>24 A No.</p> <p>25 Q Did you make an effort to determine</p>	<p style="text-align: right;">Page 41</p> <p>1 BY MR. PLACITELLA:</p> <p>2 Q So let me -- let's walk -- walk through</p> <p>3 it.</p> <p>4 A All right.</p> <p>5 Q You see on page 3, there was -- you had</p> <p>6 a reference to a Kerrigan study from '17?</p> <p>7 A Yes.</p> <p>8 Q So let's just walk through it. So</p> <p>9 page 1, nothing. No reference to any studies.</p> <p>10 MR. FROST: Objection. That's the</p> <p>11 Summary of Opinions.</p> <p>12 BY MR. PLACITELLA:</p> <p>13 Q Just making sure we're doing the right</p> <p>14 counting. Nothing on page 1?</p> <p>15 A No.</p> <p>16 Q Nothing on page 2?</p> <p>17 MR. FROST: Same objection.</p> <p>18 BY MR. PLACITELLA:</p> <p>19 Q Correct?</p> <p>20 I'm just focusing on studies other than</p> <p>21 citing to yourself.</p> <p>22 A Yes, mm-hmm.</p> <p>23 Q Okay. On page 3, I found one, but</p> <p>24 actually you were part of that study as well. You</p> <p>25 just cited it as Kerrigan, et al., on the bottom,</p>

<p style="text-align: right;">Page 42</p> <p>1 correct?</p> <p>2 A Yes.</p> <p>3 Q All right. So that would be -- I'll</p> <p>4 take that one out.</p> <p>5 So none on page 4.</p> <p>6 A There is a reference on page 4, but it</p> <p>7 is to my work with that --</p> <p>8 Q Right. I'm just looking for research</p> <p>9 that you did that -- where you found studies to</p> <p>10 support your conclusions other than citing</p> <p>11 yourself. Okay?</p> <p>12 So nothing on page 4?</p> <p>13 A Correct.</p> <p>14 Q Okay. Nothing on page 5?</p> <p>15 A That's correct.</p> <p>16 Q Nothing on page 6?</p> <p>17 A That's correct.</p> <p>18 Q You do cite a study on page 7 of 2007</p> <p>19 concerning rocks around Mount Etna?</p> <p>20 A Correct.</p> <p>21 Q Okay. Well, that has -- that doesn't</p> <p>22 relate to any of the mines at issue in this case,</p> <p>23 though, correct?</p> <p>24 A That's correct.</p> <p>25 Q Okay. Nothing on page 8?</p>	<p style="text-align: right;">Page 44</p> <p>1 Q Okay. Does that have anything that's</p> <p>2 directly at issue in this case?</p> <p>3 A That's a complicated question.</p> <p>4 Q Well, let me rephrase it. It was a bad</p> <p>5 question.</p> <p>6 Does this relate directly to any of the</p> <p>7 mines at issue in this case?</p> <p>8 A No.</p> <p>9 Q Okay. Don't see anything on page 10?</p> <p>10 A Yeah, mm-hmm.</p> <p>11 Q On page 11, you cite NIOSH and Weill.</p> <p>12 Are you involved in that Weill paper?</p> <p>13 A What page are we on again, please?</p> <p>14 Q Page 11.</p> <p>15 A I cite -- yes, that's the editor of the</p> <p>16 journal, special issue of the journal in</p> <p>17 Toxicology and Applied Pharmacology, and I am an</p> <p>18 editor, yes.</p> <p>19 Q Okay. So you were a part of that paper.</p> <p>20 A It's not a paper. It's a -- well, it's</p> <p>21 this chart.</p> <p>22 Q Okay.</p> <p>23 A Yes.</p> <p>24 Q I'll leave it on there.</p> <p>25 You cite NIOSH.</p>
<p style="text-align: right;">Page 43</p> <p>1 A I cite EOS. That's a publication.</p> <p>2 Q Okay.</p> <p>3 A And on page 7, I cite the U.S.</p> <p>4 Geological Survey.</p> <p>5 Q Okay. Let's make sure we get that</p> <p>6 right.</p> <p>7 That's here (indicating)?</p> <p>8 A Yes.</p> <p>9 Q Okay. This you cite -- well, let's go</p> <p>10 back to page 7. The citation you have on page 7</p> <p>11 to the U.S. Geological Survey, that does not</p> <p>12 relate to any of the mines at issue in this case,</p> <p>13 correct?</p> <p>14 A Correct.</p> <p>15 Q Okay. On page 8, you point out that --</p> <p>16 you cite EOS. That has to do with mines not</p> <p>17 involved in this case, correct?</p> <p>18 A That's --</p> <p>19 MR. FROST: Objection to form.</p> <p>20 THE WITNESS: -- correct.</p> <p>21 BY MR. PLACITELLA:</p> <p>22 Q All right. Page 9, anything?</p> <p>23 A The Geological Survey is cited.</p> <p>24 Q That's where you downloaded the photo.</p> <p>25 A Correct.</p>	<p style="text-align: right;">Page 45</p> <p>1 A Yes.</p> <p>2 Q Okay. None of these citations directly</p> <p>3 relate to mines at issue in this case, correct?</p> <p>4 A That -- I believe that that -- what</p> <p>5 you're asking me, is there anything about these,</p> <p>6 Italian mine or the Vermont mine in these</p> <p>7 publications.</p> <p>8 Q Correct.</p> <p>9 A That would be correct.</p> <p>10 Q Okay. You cite on page 13 to an article</p> <p>11 by Crane. Did the Crane article have anything to</p> <p>12 do with the Italian or Vermont mine?</p> <p>13 A No.</p> <p>14 MR. FROST: Objection.</p> <p>15 BY MR. PLACITELLA:</p> <p>16 Q Okay. Page 14, anything on page 14 have</p> <p>17 anything directly to do with the Italian or</p> <p>18 Vermont mine at issue in this case?</p> <p>19 A Any of the citations?</p> <p>20 Q Yes, ma'am.</p> <p>21 A No.</p> <p>22 Q Okay. I should call you "Doctor."</p> <p>23 I'm -- I apologize.</p> <p>24 A That's all right.</p> <p>25 Q Page 15, you cite to the report of</p>

<p style="text-align: right;">Page 46</p> <p>1 Dr. Longo and Rigler, correct?</p> <p>2 A That's correct.</p> <p>3 Q All right. But to no external research</p> <p>4 that you've done to support your opinions in this</p> <p>5 case, correct?</p> <p>6 MR. FROST: Objection to form.</p> <p>7 THE WITNESS: That's a complicated</p> <p>8 question.</p> <p>9 BY MR. PLACITELLA:</p> <p>10 Q Well, you don't have any citations on</p> <p>11 page 15.</p> <p>12 A That's correct.</p> <p>13 Q Okay.</p> <p>14 A That's correct.</p> <p>15 Q Okay. Same question with respect to 16.</p> <p>16 A That's correct.</p> <p>17 MR. FROST: I'll object to that, that</p> <p>18 there are citations.</p> <p>19 MR. PLACITELLA: Please object to form,</p> <p>20 and -- and leave it at that.</p> <p>21 MR. FROST: Okay. I'll object to form.</p> <p>22 MR. PLACITELLA: Okay. Thank you.</p> <p>23 BY MR. PLACITELLA:</p> <p>24 Q Page 17, do you have any citations to</p> <p>25 any studies or literature related to the mines at</p>	<p style="text-align: right;">Page 48</p> <p>1 first 20 pages of your report, you do not have any</p> <p>2 citation that is -- directly relates to the mines</p> <p>3 at issue in this case other than the one report</p> <p>4 given to you by Mr. Frost?</p> <p>5 MR. FROST: Objection to form.</p> <p>6 THE WITNESS: There are no citations</p> <p>7 that specifically relate to -- that specifically</p> <p>8 mention those deposits.</p> <p>9 BY MR. PLACITELLA:</p> <p>10 Q Okay. Then on page 21, you do have some</p> <p>11 citations that relate to the mines at issue in</p> <p>12 this case, correct?</p> <p>13 A Chidester and Gilson.</p> <p>14 Q Correct.</p> <p>15 A The Argonaut Mine, is -- is that one of</p> <p>16 the mines?</p> <p>17 Q Yes, ma'am.</p> <p>18 A So the Chidester article does relate</p> <p>19 directly to that.</p> <p>20 Q Okay.</p> <p>21 A Gilson is a little less clear in exactly</p> <p>22 what the -- you know, what he's describing. He</p> <p>23 describes many, many, many occurrences. So I</p> <p>24 don't know whether he directly identifies those</p> <p>25 mines. He does talk about Windsor County.</p>
<p style="text-align: right;">Page 47</p> <p>1 issue in this case?</p> <p>2 MR. FROST: Same objection.</p> <p>3 THE WITNESS: No.</p> <p>4 BY MR. PLACITELLA:</p> <p>5 Q Okay. Page 18, you mention the Val</p> <p>6 Chisone deposit, correct?</p> <p>7 A Chisone Valley, yes.</p> <p>8 Q Right. But there are no citations to</p> <p>9 any literature related to that on this page,</p> <p>10 correct?</p> <p>11 A Correct.</p> <p>12 Q Okay. On page 19, you have a citation</p> <p>13 to a work by Sanford in 1982, correct?</p> <p>14 A That is correct.</p> <p>15 Q That does not relate to any of the</p> <p>16 mines that -- that does not involve any of the</p> <p>17 mines at issue in this case, correct?</p> <p>18 A No. Not directly, no.</p> <p>19 Q Okay. Then on page 20, you have the --</p> <p>20 a citation to Dr. Pooley. Correct?</p> <p>21 A Yes.</p> <p>22 Q That was the study that you referred to</p> <p>23 that was given to you by Mr. Frost?</p> <p>24 A That is correct.</p> <p>25 Q Okay. So am I correct that for the</p>	<p style="text-align: right;">Page 49</p> <p>1 Q Okay, I'll give you that one.</p> <p>2 Okay. So let's just focus on these two</p> <p>3 studies. Assuming that the evidence in this case</p> <p>4 is that Johnson & Johnson did not use any Vermont</p> <p>5 talc before the 1960s, none of the references in</p> <p>6 your paper directly relate to Vermont talc used</p> <p>7 before 1960, correct?</p> <p>8 MR. FROST: Objection to form.</p> <p>9 BY MR. PLACITELLA:</p> <p>10 Q Well, let me ask the question</p> <p>11 differently. It was a bad question.</p> <p>12 You do not have any references</p> <p>13 concerning Vermont talc in your report that</p> <p>14 postdate 1960, correct?</p> <p>15 MR. FROST: Objection to form.</p> <p>16 THE WITNESS: The Pooley reports</p> <p>17 postdate that.</p> <p>18 BY MR. PLACITELLA:</p> <p>19 Q I thought the Pooley report that you are</p> <p>20 citing referenced the Italian talc.</p> <p>21 A Oh, there's also a Pooley report that</p> <p>22 describes the deposits in Ludlow -- around Ludlow,</p> <p>23 Vermont.</p> <p>24 Q Okay. I don't see that in your report.</p> <p>25 Where --</p>

<p style="text-align: right;">Page 50</p> <p>1 A It's in my reference list.</p> <p>2 Q But in your report, which comprises and</p> <p>3 supports your opinions in this case, you do not</p> <p>4 mention any Pooley report related to the Vermont</p> <p>5 mines, correct?</p> <p>6 MR. FROST: Objection to form.</p> <p>7 THE WITNESS: That's incorrect. On</p> <p>8 page 20, the subtitle is "Comments on Windsor</p> <p>9 County Talc Deposits."</p> <p>10 BY MR. PLACITELLA:</p> <p>11 Q Oh, great. Okay.</p> <p>12 A And I reference Pooley, 1972.</p> <p>13 Q Okay, great.</p> <p>14 So the only reference that you have</p> <p>15 concerning the Vermont mines that postdates 1960</p> <p>16 is an unpublished report from Pooley that was</p> <p>17 given to you by counsel for Johnson & Johnson,</p> <p>18 correct?</p> <p>19 A That would be --</p> <p>20 MR. FROST: Objection to form.</p> <p>21 THE WITNESS: That would be correct.</p> <p>22 BY MR. PLACITELLA:</p> <p>23 Q Okay. And -- now, let me just go down</p> <p>24 to your references for the Val Chisone, Italy</p> <p>25 deposits. Do you see that?</p>	<p style="text-align: right;">Page 52</p> <p>1 Q Okay. Am I correct that time frame</p> <p>2 matters in terms of when -- the relevance of</p> <p>3 sampling done in a mine?</p> <p>4 MR. FROST: Objection.</p> <p>5 BY MR. PLACITELLA:</p> <p>6 Q It's relevant.</p> <p>7 A It's relevant.</p> <p>8 Q All right. Because you can take a</p> <p>9 sample from one level of a mine, for example,</p> <p>10 being explored in 1927, and that may have</p> <p>11 different results from a level of a mine that was</p> <p>12 the same mine that was sampled in 1967.</p> <p>13 A It -- it would depend on the mine, but</p> <p>14 in general, I think you'd have to assume the</p> <p>15 possibility of variation with time.</p> <p>16 Q Okay. Thank you.</p> <p>17 Am I correct that your report does not</p> <p>18 cite to a single published study concerning the</p> <p>19 Italian mines that postdates 1975?</p> <p>20 A That would be incorrect.</p> <p>21 Q Okay. Please show me -- oh, you're</p> <p>22 correct.</p> <p>23 Let me ask the question again. Any</p> <p>24 citation concerning an Italian mine that you have</p> <p>25 in your report postdates 1975 for published</p>
<p style="text-align: right;">Page 51</p> <p>1 A Yes.</p> <p>2 Q It's on page 21.</p> <p>3 A Yes. Mm-hmm.</p> <p>4 Q Okay. You cite to Lightfoot, et al.,</p> <p>5 1972. Was that a published paper?</p> <p>6 A No. That is the report that Pooley</p> <p>7 was -- participated in, but in the reference list</p> <p>8 Lightfoot is the first author.</p> <p>9 Q Okay. So that's an unpublished report.</p> <p>10 A That is correct.</p> <p>11 Q Okay. And not peer reviewed.</p> <p>12 A No.</p> <p>13 Q Okay. And the other Pooley report that</p> <p>14 you cited to concerning the Windsor mines, that</p> <p>15 was not peer reviewed, correct?</p> <p>16 A No. No.</p> <p>17 Q Okay. So I see further that -- by the</p> <p>18 way, do you know when Johnson & Johnson stopped</p> <p>19 purchasing talc from its -- the Italian source for</p> <p>20 use in the United States?</p> <p>21 A I think you just told me, didn't you?</p> <p>22 Q No. Italian source.</p> <p>23 A Oh. No.</p> <p>24 Q Would that be relevant to your opinions?</p> <p>25 A I didn't -- no. I -- perhaps.</p>	<p style="text-align: right;">Page 53</p> <p>1 literature, correct?</p> <p>2 MR. FROST: Objection to form.</p> <p>3 THE WITNESS: There are several articles</p> <p>4 postdate 1975 that deal directly with the Fontaine</p> <p>5 mine.</p> <p>6 BY MR. PLACITELLA:</p> <p>7 Q Yes.</p> <p>8 A Yes.</p> <p>9 Q But all of your citations that support</p> <p>10 your conclusions concerning the Italian mine in</p> <p>11 terms of public -- published literature postdate</p> <p>12 1975, correct?</p> <p>13 MR. FROST: Objection to form.</p> <p>14 THE WITNESS: Yeah, I think that's</p> <p>15 correct.</p> <p>16 BY MR. PLACITELLA:</p> <p>17 Q Okay. Now, you cite -- by the way, do</p> <p>18 you recall you cited to the Chidester article in</p> <p>19 1951?</p> <p>20 A Yes.</p> <p>21 Q Okay. Do you know what test methods</p> <p>22 Dr. Chidester used in 1951?</p> <p>23 A I do not.</p> <p>24 Q Okay. And were you aware -- or you</p> <p>25 cited also to the Argonaut Mine as an example in</p>

<p style="text-align: right;">Page 54</p> <p>1 your report.</p> <p>2 MR. FROST: Objection to form.</p> <p>3 THE WITNESS: Yes.</p> <p>4 BY MR. PLACITELLA:</p> <p>5 Q And -- what page was that?</p> <p>6 A Page 21.</p> <p>7 Q You say that Pooley -- the Pooley</p> <p>8 article you referenced for -- for Vermont was</p> <p>9 1972, correct?</p> <p>10 A That -- that's correct.</p> <p>11 Q Okay. And then you state on page 21</p> <p>12 that: "Pooley's detailed descriptions are</p> <p>13 consistent with published descriptions of talc</p> <p>14 mines in the Ludlow, Vermont area. The minerals</p> <p>15 list in the ore from several mines, including</p> <p>16 Argonaut Mine by mindat.org."</p> <p>17 Do you see that?</p> <p>18 A Yes.</p> <p>19 Q Okay. What is mindat.org?</p> <p>20 A It's a mineral database that's -- lists</p> <p>21 information about a mineral, any mineral that you</p> <p>22 want, and they -- in this particular case, they</p> <p>23 included the Argonaut Mine in the list of</p> <p>24 minerals.</p> <p>25 Q Okay. But you didn't do any independent</p>	<p style="text-align: right;">Page 56</p> <p>1 BY MR. PLACITELLA:</p> <p>2 Q Would that have been relevant to your</p> <p>3 opinions?</p> <p>4 MR. FROST: Objection.</p> <p>5 THE WITNESS: No.</p> <p>6 BY MR. PLACITELLA:</p> <p>7 Q So if Johnson & Johnson had core</p> <p>8 sampling results showing there was asbestos in the</p> <p>9 Argonaut Mine, that would have no relevance to</p> <p>10 your opinions?</p> <p>11 MR. FROST: Objection to form.</p> <p>12 THE WITNESS: It -- no.</p> <p>13 BY MR. PLACITELLA:</p> <p>14 Q Why not?</p> <p>15 A Because I was asked to review the</p> <p>16 literature. I -- I had a very specific</p> <p>17 assignment.</p> <p>18 Q Okay. But I'm -- as a scientist, would</p> <p>19 it matter to you that you were asked to provide a</p> <p>20 report concerning the likelihood of asbestos being</p> <p>21 in a Johnson & Johnson mine, and Johnson & Johnson</p> <p>22 had testing of that mine and never revealed it to</p> <p>23 you?</p> <p>24 MR. FROST: Objection to form.</p> <p>25 THE WITNESS: No.</p>
<p style="text-align: right;">Page 55</p> <p>1 research concerning the Argonaut Mine --</p> <p>2 A I did not.</p> <p>3 Q -- other than that.</p> <p>4 And were you aware when you were putting</p> <p>5 your report together that the Argonaut Mine did</p> <p>6 not open until 1974?</p> <p>7 MR. FROST: Objection to form.</p> <p>8 THE WITNESS: No.</p> <p>9 BY MR. PLACITELLA:</p> <p>10 Q Would that have been relevant to the</p> <p>11 consideration of your opinions in this case?</p> <p>12 MR. FROST: Objection.</p> <p>13 THE WITNESS: Well, perhaps, but I knew</p> <p>14 there were mines other than the Argonaut Mine</p> <p>15 providing material. So...</p> <p>16 BY MR. PLACITELLA:</p> <p>17 Q Well, I understand that, but you picked</p> <p>18 Argonaut as an example. Why did you pick</p> <p>19 Argonaut?</p> <p>20 A It's the only thing I could find.</p> <p>21 Q Okay. Well, did Johnson & Johnson ever</p> <p>22 tell you that they had core sampling results for</p> <p>23 the Argonaut Mine?</p> <p>24 MR. FROST: Objection to form.</p> <p>25 THE WITNESS: No.</p>	<p style="text-align: right;">Page 57</p> <p>1 BY MR. PLACITELLA:</p> <p>2 Q Okay. You say in your report -- well,</p> <p>3 let's just go to the summary in your report, your</p> <p>4 summary of your opinions -- you state in your</p> <p>5 report: "Based upon their geologic settings,</p> <p>6 reports from mine geologists and literature,</p> <p>7 descriptions of the ore deposits provided in</p> <p>8 cosmetic talc for the relevant body powder, it is</p> <p>9 unlikely that asbestos could be found in the talc</p> <p>10 mines -- in the talc products from these mines."</p> <p>11 Correct?</p> <p>12 MR. FROST: Where are you reading from,</p> <p>13 Chris?</p> <p>14 THE WITNESS: Please show me where you</p> <p>15 are.</p> <p>16 MR. PLACITELLA: Why don't we take a</p> <p>17 break, and I'll highlight it and move it faster</p> <p>18 that way. How's that?</p> <p>19 MR. FROST: Sounds good. Let's take a</p> <p>20 break.</p> <p>21 THE VIDEOGRAPHER: The time is</p> <p>22 10:14 a.m. We're going off the record.</p> <p>23 (Recess.)</p> <p>24 THE VIDEOGRAPHER: The time is 10:27</p> <p>25 a.m., and we are back on the record.</p>

1 BY MR. PLACITELLA:

2 Q Okay. I believe you told me that
3 information in possession of the Johnson & Johnson
4 concerning whether there was asbestos in the
5 Johnson & Johnson talc mines was irrelevant to you
6 because it was not part of your charge. Is that
7 your testimony?

8 MR. FROST: Objection to form.

9 THE WITNESS: My charge was to review
10 the literature and the reports by Drs. Longo and
11 Rigler. So it did not include requests to review
12 anything else.

13 BY MR. PLACITELLA:

14 Q But you did review unpublished reports
15 provided to you by counsel of Dr. Pooley related
16 to the mines at issue, correct?

17 A I did.

18 Q Okay. So those unpublished reports were
19 relevant to your opinions according to your own
20 report, correct?

21 MR. FROST: Objection. Form.

22 THE WITNESS: They were relevant
23 particularly because of the paucity of data in the
24 literature.

25 BY MR. PLACITELLA:

1 Q And if Johnson & Johnson had more data
2 in addition to the Pooley reports, that certainly
3 would have been relevant to your opinions, just
4 like the Pooley reports were relevant to your
5 opinions, correct?

6 MR. FROST: Objection to form.

7 THE WITNESS: I was not asked to review
8 testing of materials other than the description of
9 the geology of the mine.

10 BY MR. PLACITELLA:

11 Q Doctor, you just told me that the Pooley
12 reports were relevant to your opinions, and in
13 fact, you put them in your report, correct?

14 A Correct.

15 Q And if Johnson & Johnson had additional
16 reports concerning analysis of their mine, that
17 certainly would have been relevant to your
18 opinions, just like the Pooley reports were,
19 correct?

20 MR. FROST: Objection.

21 THE WITNESS: I was asked to review the
22 basic geology of the mine and the geologic setting
23 of the deposits, and testing reports of products
24 are not relevant.

25 BY MR. PLACITELLA:

1 Q Ma'am, I'm not talking about products.
2 I'm talking about testing reports related to what
3 was coming out of the mine.

4 A Oh, I -- I'm sorry --

5 MR. FROST: Objection to form.

6 THE WITNESS: -- I misunderstood.

7 BY MR. PLACITELLA:

8 Q All right. So if Johnson & Johnson had
9 other testing reports like Pooley's concerning
10 what was coming out of the mine, that certainly
11 would have been relevant to your opinions,
12 correct?

13 MR. FROST: Objection.

14 THE WITNESS: It's very hard to say
15 without seeing them.

16 BY MR. PLACITELLA:

17 Q But you were not provided any reports
18 other than the select report from Dr. Pooley,
19 correct?

20 MR. FROST: Objection to form.

21 THE WITNESS: I was only provided the
22 two reports by Dr. Pooley.

23 BY MR. PLACITELLA:

24 Q Did you ask counsel for Johnson &
25 Johnson, were there any other similar reports of

1 the Vermont mine other than Dr. Pooley?

2 MR. FROST: Objection.

3 THE WITNESS: I asked if -- if there --
4 let me just say what I -- I asked if they had any
5 other information on the geology of the deposits.

6 BY MR. PLACITELLA:

7 Q And the response was what?

8 A No.

9 Q Now -- okay. I want -- I want to just
10 make sure I got one of the things you said before
11 correct. Is it your opinion that the geology of
12 all the talc mines in Vermont would be essentially
13 the same?

14 A It is not.

15 Q It is not. Okay.

16 And how would it differ?

17 A The minerals that are present vary in
18 abundance and in what they are, the identity of
19 the mineral.

20 Q Okay. Now, I want to just go back to
21 your report what we were talking about when we
22 broke. I want to ask you about some statements in
23 your report.

24 You state in your report as a basis for
25 your report, correct --

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1 A I'm sorry. Would you please --
 2 Q I'm sorry. Page 4.
 3 "Talc ore is mined for both industrial
 4 and cosmetic use but from different ore bodies and
 5 in different mines."
 6 And then you say: "Talc ore used for
 7 cosmetic purposes, however, is different." See
 8 that?
 9 A Yes.
 10 Q Did Johnson & Johnson tell you that they
 11 obtained the talc for industrial use and cosmetic
 12 use from the exact same mine in Vermont?
 13 MR. FROST: Objection to form.
 14 THE WITNESS: No.
 15 BY MR. PLACITELLA:
 16 Q Did they tell you the opposite?
 17 A No.
 18 Q Okay.
 19 (Exhibit J&J-188 was presented to
 20 the witness.)
 21 BY MR. PLACITELLA:
 22 Q I'm going to show you what's been marked
 23 J&J 188. I'm going to put it on the iPad --
 24 sorry. Got to find a better way to do that.
 25 THE VIDEOGRAPHER: I will pass it over

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1 for you, Counsel.
 2 MR. PLACITELLA: Okay, thanks.
 3 BY MR. PLACITELLA:
 4 Q J&J 188 is -- attaches an affidavit from
 5 the president of Windsor Minerals, which is a
 6 Johnson & Johnson subsidiary that owned the
 7 Johnson & Johnson mine. See that, from Roger
 8 Miller?
 9 And that was submitted in Middlesex
 10 County, New Jersey, as part of a basis by Johnson
 11 & Johnson to request that the plaintiff dismiss
 12 their case as reflected on the first page. Do you
 13 see that?
 14 MR. FROST: Objection to form.
 15 BY MR. PLACITELLA:
 16 Q It says: "Enclosed please find" --
 17 here, let's blow it up.
 18 It says: "Enclosed please find an
 19 affidavit on behalf of Windsor Minerals, signed by
 20 Roger N. Miller, President of Windsor Minerals
 21 since 1968: Do you see that?
 22 Then it goes on and says: "I trust that
 23 these documents will now enable you to sign a
 24 Dismissal as was done in the Yuhas file. I have
 25 taken the liberty of drafting the Dismissal and

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1 enclosing the same for your signature, along with
 2 a self-addressed envelope."
 3 Do you see that?
 4 A Yes.
 5 Q And then the affidavit of Johnson &
 6 Johnson is attached. Do you see that?
 7 MR. FROST: Objection to form.
 8 BY MR. PLACITELLA:
 9 Q And the affidavit on page -- on
 10 paragraph 2 states: "The exclusive business of
 11 Windsor Minerals is/has been for the last 18 years
 12 the mining and milling of talc from a single
 13 mining district in Windsor, Vermont. The mining
 14 district is the exclusive source of talc for all
 15 of the Johnson's Baby Powder sold in the United
 16 States. In addition to supplying the talc for
 17 Johnson's Baby Powder, Windsor Mineral also sells
 18 a portion of its product to independent industrial
 19 users."
 20 Do you see that?
 21 A I do.
 22 Q That --
 23 MR. FROST: Objection to the form.
 24 BY MR. PLACITELLA:
 25 Q That information was not supplied to you

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1 by Johnson & Johnson when forming your opinions,
 2 correct?
 3 MR. FROST: Objection.
 4 THE WITNESS: I've never seen this
 5 affidavit.
 6 BY MR. PLACITELLA:
 7 Q And after you wrote in your report:
 8 "Talc ore is mined for both industrial and
 9 cosmetic use but for different -- but from
 10 different ore bodies and in different mines,"
 11 after you wrote that in your report, Johnson &
 12 Johnson never corrected that and told you they had
 13 contrary information, correct?
 14 MR. FROST: Objection. That certainly
 15 misstates the document.
 16 THE WITNESS: No.
 17 BY MR. PLACITELLA:
 18 Q Okay. Now, in your report -- going back
 19 to the ELMO for a second -- you make a number of
 20 statements about geology.
 21 The first on page 18, you state: "Based
 22 under geologic settings, report from mine
 23 geologists and literature descriptions of the ore
 24 deposits providing cosmetic talc for Johnson's
 25 Baby Powder and Shower to Shower, it is highly

<p style="text-align: right;">Page 66</p> <p>1 unlikely that asbestos could be found in the talc 2 products from these mines." Correct? 3 A That's what it says, yes. 4 Q All right. You further state on page 20 5 of your report, talking about the same deposits: 6 "There is nothing about the mode of formation of 7 this type of talc deposit that favors the 8 formation of asbestos." Correct? 9 A That's correct. 10 Q And then you -- as it relates to Pooley, 11 you say: "It's my understanding that the ore from 12 the mine was the source of some of the talcum 13 powder involved in this litigation." 14 What mine was Pooley studying? 15 MR. FROST: Objection to form. 16 If you know. 17 BY MR. PLACITELLA: 18 Q If you recall. 19 A I think the name Windsor was in the 20 report, but I -- I don't recollect. 21 Q Okay. "He and his team examined the 22 samples he collected throughout the mine, 23 including the ore and foot and hanging wall, and 24 examined them by PLM x-ray defraction and 25 transmission electron microscopy." See that?</p>	<p style="text-align: right;">Page 68</p> <p>1 Q So that's different. 2 A Yes. 3 Q So that's irrelevant to Ludlow? 4 A Yes. 5 Q Okay. How come it's in your report? 6 A Because it's related to the Italian 7 mines. 8 Q Okay. And then you state: "Cosmetic 9 forming veins of asbestos has not been reported in 10 cosmetic talc ore to my knowledge." 11 Does that refer to -- 12 A Could you repeat the question, please? 13 Q Yes, ma'am. In your report you state: 14 "Cosmetic-forming veins of asbestos has" -- 15 chryso- -- I'm sorry. Scratch that. 16 "Chrysotile-forming veins of asbestos 17 has not been reported in cosmetic talc ore to my 18 knowledge." 19 Does that refer to the Italian mines, 20 the Vermont mines, or both? 21 A This particular comment is under the 22 section on carbonate-hosted sources. Let me 23 just -- no, I'm sorry, it doesn't. Three, that 24 would refer to Johnson -- I mean to the talc mines 25 in Vermont.</p>
<p style="text-align: right;">Page 67</p> <p>1 A Yes. 2 Q Okay. Then you go on to state, and 3 we -- we went over this before: "Pooley's 4 detailed descriptions are consistent with 5 published descriptions of talc mines in the 6 Ludlow, Vermont area. The minerals list in the 7 ore from several mines, including the Argonaut 8 Mine by mindat.org." Do you see that? 9 A Yes. 10 Q Okay. And then you go on to state 11 further down the page: "There is nothing about 12 the mode or formation of this type of talc deposit 13 that favors the formation of asbestos. However, 14 this type of deposit is not known for associated 15 asbestos." 16 Do you see that? 17 MR. FROST: I will object to the form. 18 THE WITNESS: Show me where you're 19 reading. 20 BY MR. PLACITELLA: 21 Q Yes, ma'am. 22 A I'm sorry. 23 Q So your -- 24 A So we've changed from Ludlow. We're now 25 talking about carbonate-hosted deposits.</p>	<p style="text-align: right;">Page 69</p> <p>1 Q Okay. 2 A Yes, as well. 3 Q And in your summary on the top, you say: 4 "When is asbestos likely to be found in talc 5 ores?" Correct? 6 A Yes. 7 Q And your summary is: "The formation of 8 talc does not require or favor the formation of 9 asbestos in the ore." 10 Do you see that? 11 A Yes. 12 Q Okay. 13 A Yes. 14 Q And then underneath that is where you 15 say, Chrysotile has never been found in any 16 cosmetic talc ore to your knowledge, and you're 17 talking about Vermont. Correct? 18 A Yes. 19 Q Okay. Then again in your conclusions 20 you state: "Although talc and asbestos can form 21 in proximity to one another, the formation of talc 22 does not require or favor the formation of 23 asbestos in the ore." 24 And then you say: "Based on the 25 geologic settings, reports from the mine</p>

<p style="text-align: right;">Page 70</p> <p>1 geologists" --</p> <p>2 When you say "reports from the mine</p> <p>3 geologists," you're talking about in the published</p> <p>4 literature?</p> <p>5 A The only reports that I have on the</p> <p>6 mines were from the Pooley -- from Cardiff.</p> <p>7 Q Okay. So when you say "reports from the</p> <p>8 mine geologists," you're talking about the private</p> <p>9 reports, not the published reports.</p> <p>10 A I am.</p> <p>11 Q Okay. Those are the reports that</p> <p>12 Johnson & Johnson gave you.</p> <p>13 A That's correct.</p> <p>14 Q Okay.</p> <p>15 -- "and literature descriptions of the</p> <p>16 ore deposits used to source the talc for the</p> <p>17 cosmetic talc products at issue in this</p> <p>18 litigation, it is unlikely that asbestos occurs in</p> <p>19 these deposits." Do you see that?</p> <p>20 A Yes.</p> <p>21 Q And when you say "these deposits," do</p> <p>22 you mean both the Italian and the chrysotile</p> <p>23 deposits?</p> <p>24 MR. FROST: Objection.</p> <p>25 THE WITNESS: Chrysotile deposits --</p>	<p style="text-align: right;">Page 72</p> <p>1 Q Okay. And it was done by Walter</p> <p>2 McCrone?</p> <p>3 A It was from his lab.</p> <p>4 Q Right. And they're a respected</p> <p>5 laboratory, correct?</p> <p>6 MR. FROST: Objection to form.</p> <p>7 THE WITNESS: They are -- were.</p> <p>8 BY MR. PLACITELLA:</p> <p>9 Q And this report was not given to you by</p> <p>10 Mr. Frost along with the Pooley reports, correct?</p> <p>11 MR. FROST: Objection.</p> <p>12 THE WITNESS: It was not. I've never</p> <p>13 seen it before.</p> <p>14 BY MR. PLACITELLA:</p> <p>15 Q And if you go to Table 2 of the report,</p> <p>16 do you see where it talks about the results for</p> <p>17 the electron microscope on the talc ore for core</p> <p>18 samples?</p> <p>19 A Yes.</p> <p>20 Q Then if you look at the chart, it</p> <p>21 actually talks about how far down in the mine they</p> <p>22 took the samples for each sample. Do you see</p> <p>23 that?</p> <p>24 MR. FROST: Objection to form.</p> <p>25 BY MR. PLACITELLA:</p>
<p style="text-align: right;">Page 71</p> <p>1 BY MR. PLACITELLA:</p> <p>2 Q My mistake.</p> <p>3 Do you mean both the Italian and the</p> <p>4 Vermont deposits?</p> <p>5 A Yes.</p> <p>6 Q Okay. Now -- sorry. I don't know how</p> <p>7 to -- so I just apologize to you.</p> <p>8 MR. PLACITELLA: I'm going back to the</p> <p>9 iPad now.</p> <p>10 THE VIDEOGRAPHER: Got it, sir.</p> <p>11 (Exhibit J&J-65 was presented to</p> <p>12 the witness.)</p> <p>13 BY MR. PLACITELLA:</p> <p>14 Q I've handed you a report from Mr. Vernon</p> <p>15 Zeitz concerning Windsor Mineral Corporation,</p> <p>16 "Examination of Talc Samples: The Argonaut Ore</p> <p>17 Body."</p> <p>18 Do you see that?</p> <p>19 A Yes.</p> <p>20 Q Okay. And that was done in 1974,</p> <p>21 correct?</p> <p>22 A Yes.</p> <p>23 Q The same year of the report that they</p> <p>24 gave you related to Dr. Pooley, correct?</p> <p>25 A I think Dr. Pooley's reports were 1972.</p>	<p style="text-align: right;">Page 73</p> <p>1 Q If you look at the second row where it</p> <p>2 says "Description Designation" --</p> <p>3 Here, let's blow it up.</p> <p>4 A It doesn't explain what that is.</p> <p>5 Q Well, I'll represent to you -- do you</p> <p>6 know who Dr. Hopkins is?</p> <p>7 A No.</p> <p>8 Q I'll represent to you that Dr. Hopkins</p> <p>9 testified in this case that those were the depths</p> <p>10 from which the samples were taken. Do you see</p> <p>11 that?</p> <p>12 A I do.</p> <p>13 MR. FROST: Objection to form.</p> <p>14 BY MR. PLACITELLA:</p> <p>15 Q Okay. And do you see that they have a</p> <p>16 column entitled "Chrysotile"?</p> <p>17 A I do.</p> <p>18 Q And one for "Amphibole." Do you see</p> <p>19 that?</p> <p>20 A I do.</p> <p>21 Q Okay. And do you see in all the</p> <p>22 highlighted sections where McCrone found</p> <p>23 chrysotile in these core samples?</p> <p>24 MR. FROST: Objection to form.</p> <p>25 THE WITNESS: I do.</p>

<p style="text-align: right;">Page 74</p> <p>1 BY MR. PLACITELLA:</p> <p>2 Q And this information was never provided</p> <p>3 to you in order for you to do your report,</p> <p>4 although you were given the unpublished</p> <p>5 information from Dr. Pooley, correct?</p> <p>6 MR. FROST: Objection.</p> <p>7 THE WITNESS: I have never seen this</p> <p>8 document.</p> <p>9 BY MR. PLACITELLA:</p> <p>10 Q Is this a document you would have liked</p> <p>11 to have seen along with Dr. Pooley's report?</p> <p>12 MR. FROST: Objection.</p> <p>13 THE WITNESS: I mean, I -- I would have</p> <p>14 to have looked at this quite carefully to know</p> <p>15 whether it would have been helpful or not, and I</p> <p>16 haven't had a chance to look at it. So...</p> <p>17 BY MR. PLACITELLA:</p> <p>18 Q Okay. Fair enough.</p> <p>19 It was not supplied to you, so you --</p> <p>20 you couldn't make a decision whether it was</p> <p>21 relevant or not, correct?</p> <p>22 A That's correct.</p> <p>23 (Exhibit J&J-89 was presented to</p> <p>24 the witness.)</p> <p>25 BY MR. PLACITELLA:</p>	<p style="text-align: right;">Page 76</p> <p>1 A I --</p> <p>2 MR. FROST: Objection to form.</p> <p>3 THE WITNESS: I do.</p> <p>4 BY MR. PLACITELLA:</p> <p>5 Q It says: "The first group consisted of</p> <p>6 29 samples which were taken from your ore body."</p> <p>7 Are you with me?</p> <p>8 A Yes.</p> <p>9 Q Okay. And they say: "The second group</p> <p>10 consists of seven samples which were sent to us</p> <p>11 subsequently to be analyzed separately. The</p> <p>12 general conclusion that we came to in this study</p> <p>13 is that these samples do show some amphiboles but</p> <p>14 at extremely low level."</p> <p>15 Do you see that?</p> <p>16 A Yes.</p> <p>17 Q Okay. And in the next paragraph, they</p> <p>18 talk about that they did a running tabulation of</p> <p>19 the samples for total fiber content. Do you see</p> <p>20 that?</p> <p>21 A Yes.</p> <p>22 Q Okay. And if you go to the Table 1,</p> <p>23 they talk about confirmed asbestos visual. Do you</p> <p>24 see that?</p> <p>25 A Yes.</p>
<p style="text-align: right;">Page 75</p> <p>1 Q Okay. Now, let me show you 89. Take a</p> <p>2 chance to look at it.</p> <p>3 J&J-89 for -- I'll describe it for the</p> <p>4 record is a report dated July 1, 1975, from</p> <p>5 McCrone to Windsor Mineral Company.</p> <p>6 Do you see that?</p> <p>7 A I see -- is there a title where -- the</p> <p>8 report you're referring to? I see a letter --</p> <p>9 Q Right, there's a letter --</p> <p>10 A -- from Mr. Grieger --</p> <p>11 Q -- with attached -- correct.</p> <p>12 A And some tables attached.</p> <p>13 Q Correct. I want to go through those.</p> <p>14 This letter and tables were never</p> <p>15 provided to you by Johnson & Johnson along with</p> <p>16 the Pooley report, correct?</p> <p>17 A Correct.</p> <p>18 Q Okay. And in the first paragraph,</p> <p>19 McCrone advises Johnson & Johnson that: "We have</p> <p>20 examined two groups of samples using electron</p> <p>21 microscope and selected area electron defraction</p> <p>22 to determine the extent of amphiboles or</p> <p>23 serpentine contamination in these two groups of</p> <p>24 samples."</p> <p>25 See that?</p>	<p style="text-align: right;">Page 77</p> <p>1 Q And they indicate that on the samples,</p> <p>2 at least that I've highlighted, that they found --</p> <p>3 they confirmed asbestos visually in talc samples</p> <p>4 with the label "HC." Do you see that?</p> <p>5 MR. FROST: Objection to form.</p> <p>6 THE WITNESS: That you have highlighted</p> <p>7 that.</p> <p>8 BY MR. PLACITELLA:</p> <p>9 Q Yes, ma'am.</p> <p>10 A Yes, mm-hmm.</p> <p>11 Q I'm sorry. Yes, Doctor.</p> <p>12 And were you aware that HC stands for</p> <p>13 Hammondsville cosmetic talc?</p> <p>14 MR. FROST: Objection to form.</p> <p>15 THE WITNESS: No.</p> <p>16 BY MR. PLACITELLA:</p> <p>17 Q All right. On the next Table 2, they</p> <p>18 talk about description of sample content of</p> <p>19 sediment. Do you know what sediment generally</p> <p>20 refers to when they're looking at something</p> <p>21 geologically?</p> <p>22 A Yes.</p> <p>23 Q What does that refer to?</p> <p>24 A Sediment is particulate that has been</p> <p>25 deposited by water, generally.</p>

<p style="text-align: right;">Page 78</p> <p>1 Q Okay. And --</p> <p>2 A Or wind.</p> <p>3 Q Okay. And again, they list sample</p> <p>4 numbers, they have the word "asbestos," and then</p> <p>5 they quantify low to medium the number of fibers</p> <p>6 they saw, correct?</p> <p>7 MR. FROST: Objection to form.</p> <p>8 THE WITNESS: It's not clear to me what</p> <p>9 the various columns -- how they relate to one</p> <p>10 another.</p> <p>11 BY MR. PLACITELLA:</p> <p>12 Q Okay. Well, you see next to HC, they</p> <p>13 have the word "asbestos" on the column at the top,</p> <p>14 and if you go down where it says "HC," it says</p> <p>15 "low."</p> <p>16 A Yes --</p> <p>17 MR. FROST: Objection to form.</p> <p>18 THE WITNESS: -- I see that.</p> <p>19 BY MR. PLACITELLA:</p> <p>20 Q Okay. Now, this document was not</p> <p>21 provided to you as -- for your consideration and</p> <p>22 for you to determine whether it was relevant or</p> <p>23 not to your opinions, correct?</p> <p>24 MR. FROST: Objection to form.</p> <p>25 THE WITNESS: It was not provided to me.</p>	<p style="text-align: right;">Page 80</p> <p>1 And, Chris, if you have a document you</p> <p>2 want to show her --</p> <p>3 MR. PLACITELLA: I'm just asking in</p> <p>4 general.</p> <p>5 MR. FROST: -- go ahead and do that,</p> <p>6 but -- objection.</p> <p>7 THE WITNESS: As a scientist, I would</p> <p>8 like to see data.</p> <p>9 BY MR. PLACITELLA:</p> <p>10 Q Okay. So testimony would not be</p> <p>11 relevant to you.</p> <p>12 MR. FROST: Objection to form.</p> <p>13 THE WITNESS: I -- I would like to see</p> <p>14 data.</p> <p>15 BY MR. PLACITELLA:</p> <p>16 Q My question is, if there was testimony</p> <p>17 from the scientist about what he found, that would</p> <p>18 not be relevant to your considerations? That's</p> <p>19 all I'm asking.</p> <p>20 MR. FROST: Objection to form, asked and</p> <p>21 answered.</p> <p>22 THE WITNESS: No.</p> <p>23 (Exhibit J&J-179 was presented to</p> <p>24 the witness.)</p> <p>25 BY MR. PLACITELLA:</p>
<p style="text-align: right;">Page 79</p> <p>1 BY MR. PLACITELLA:</p> <p>2 Q Okay. Now, were you aware that one of</p> <p>3 the mines that was owned by Johnson & Johnson,</p> <p>4 the -- there was a scientist who testified under</p> <p>5 oath in 1983 that they found chrysotile asbestos</p> <p>6 in the talc mine?</p> <p>7 MR. FROST: Objection to form.</p> <p>8 THE WITNESS: No.</p> <p>9 BY MR. PLACITELLA:</p> <p>10 Q Would that have been relevant to your</p> <p>11 consideration?</p> <p>12 MR. FROST: Objection to form. Assumes</p> <p>13 it's correct.</p> <p>14 THE WITNESS: I don't know. It --</p> <p>15 BY MR. PLACITELLA:</p> <p>16 Q I'm going --</p> <p>17 A Testimony normally I would not have</p> <p>18 considered relevant.</p> <p>19 Q So if a scientist testified under oath</p> <p>20 that they tested the mine and found chrysotile</p> <p>21 asbestos in the Johnson talc mine, would that be</p> <p>22 relevant to your opinions as to whether it was</p> <p>23 likely or not that there was -- would be asbestos</p> <p>24 in the Johnson mine?</p> <p>25 MR. FROST: Objection to form.</p>	<p style="text-align: right;">Page 81</p> <p>1 Q Okay. Let me show you -- you have in</p> <p>2 front of you Johnson & Johnson-179, which is a</p> <p>3 letter from McCrone Associates to Roger Miller</p> <p>4 dated November 2nd, 1984.</p> <p>5 Do you see that?</p> <p>6 A Yes.</p> <p>7 Q Was this -- was this document provided</p> <p>8 to you by Johnson & Johnson along with the Pooley</p> <p>9 report concerning unpublished findings related to</p> <p>10 the Johnson & Johnson mines?</p> <p>11 MR. FROST: Objection to form.</p> <p>12 THE WITNESS: No.</p> <p>13 BY MR. PLACITELLA:</p> <p>14 Q Okay. And in this document it talks</p> <p>15 about testing that McCrone did concerning air</p> <p>16 samples using a transmission electron microscope,</p> <p>17 correct?</p> <p>18 MR. FROST: Objection to form.</p> <p>19 THE WITNESS: That's correct.</p> <p>20 BY MR. PLACITELLA:</p> <p>21 Q And what they did is, according to this</p> <p>22 letter from McCrone to -- to Johnson & Johnson,</p> <p>23 they found chrysotile asbestos in the air samples,</p> <p>24 correct?</p> <p>25 MR. FROST: Objection to form.</p>

<p style="text-align: right;">Page 82</p> <p>1 THE WITNESS: That's what the document</p> <p>2 says.</p> <p>3 BY MR. PLACITELLA:</p> <p>4 Q So, for example, where it says, Sample</p> <p>5 No. 8: 6 times 10 to the 4th, what does that mean</p> <p>6 to you?</p> <p>7 A Six with four zeroes.</p> <p>8 Q Right. So how many fibers would -- did</p> <p>9 they find?</p> <p>10 MR. FROST: Objection to form.</p> <p>11 THE WITNESS: 60,000.</p> <p>12 BY MR. PLACITELLA:</p> <p>13 Q 60,000? Now --</p> <p>14 A Pardon me. It may not indicate that</p> <p>15 they found that many particles. They extrapolated</p> <p>16 from some assessment of the filter, I would</p> <p>17 imagine. But I don't know. I really can't</p> <p>18 comment.</p> <p>19 Q Okay. You -- you were not provided the</p> <p>20 underlying data for this, correct?</p> <p>21 A No.</p> <p>22 MR. FROST: Objection.</p> <p>23 BY MR. PLACITELLA:</p> <p>24 Q And in order for you to make a fair</p> <p>25 assessment of what this means, Johnson & Johnson</p>	<p style="text-align: right;">Page 84</p> <p>1 let me just make sure we're on -- we're on the</p> <p>2 same sheet of music.</p> <p>3 What came out of the mine was not part</p> <p>4 of your assignment, just what was in the mine?</p> <p>5 MR. FROST: Objection to form.</p> <p>6 THE WITNESS: The -- my -- the request</p> <p>7 was that I describe generally the origin of talc</p> <p>8 deposits, look at it from a broad perspective, and</p> <p>9 to examine -- to find anything I could in the</p> <p>10 literature on the two mines in particular.</p> <p>11 And I was asked -- I actually asked I</p> <p>12 think for other reports -- no, I didn't. They</p> <p>13 gave me the Pooley report because I couldn't find</p> <p>14 much on the mine itself in Vermont.</p> <p>15 BY MR. PLACITELLA:</p> <p>16 Q But if Johnson & Johnson had more</p> <p>17 information on the mine in Vermont in addition to</p> <p>18 the Pooley report, that certainly would have been</p> <p>19 relevant to your consideration, correct?</p> <p>20 MR. FROST: Objection to form.</p> <p>21 THE WITNESS: This is not information</p> <p>22 about the mine.</p> <p>23 BY MR. PLACITELLA:</p> <p>24 Q Okay. I want to -- we'll get there.</p> <p>25 So -- take a look at this (indicating).</p>
<p style="text-align: right;">Page 83</p> <p>1 would have had to have provided you with the</p> <p>2 underlying data so you could study it and</p> <p>3 determine whether it was relevant or not to your</p> <p>4 opinions, correct?</p> <p>5 MR. FROST: Objection to form.</p> <p>6 And this is assuming a lot of facts that</p> <p>7 certainly aren't in the record. We've done this</p> <p>8 several times now.</p> <p>9 MR. PLACITELLA: Please, that's not a --</p> <p>10 THE WITNESS: These are air filters.</p> <p>11 There's no information on where they came from.</p> <p>12 BY MR. PLACITELLA:</p> <p>13 Q Okay. And you would need to know that</p> <p>14 in order to determine whether it was relevant to</p> <p>15 your opinion, correct, where they came from?</p> <p>16 MR. FROST: Objection to form.</p> <p>17 THE WITNESS: No.</p> <p>18 BY MR. PLACITELLA:</p> <p>19 Q Why not?</p> <p>20 A Because I was not asked to evaluate the</p> <p>21 Johnson & Johnson products. That was not my -- my</p> <p>22 assignment. My assignment was to review the</p> <p>23 literature and to review the reports, and that's</p> <p>24 all.</p> <p>25 Q If you reviewed -- so you're -- well,</p>	<p style="text-align: right;">Page 85</p> <p>1 (Exhibit J&J-202 was presented to</p> <p>2 the witness.)</p> <p>3 BY MR. PLACITELLA:</p> <p>4 Q I'm just going to describe for the</p> <p>5 record, and I'll give you a chance to look at it,</p> <p>6 this is a March 25th, 1992 report entitled "Cyprus</p> <p>7 Ore Reserves - Arsenic & Tremolite."</p> <p>8 MR. FROST: Objection to form.</p> <p>9 BY MR. PLACITELLA:</p> <p>10 Q And I'll ask you to take a look at that.</p> <p>11 MR. FROST: Misstates the document.</p> <p>12 THE WITNESS: Would you like me to read</p> <p>13 it?</p> <p>14 BY MR. PLACITELLA:</p> <p>15 Q I just want you to look at it.</p> <p>16 A Well, I've looked at it.</p> <p>17 Q Okay. And this does pertain to the mine</p> <p>18 in Vermont, correct?</p> <p>19 MR. FROST: Objection to form.</p> <p>20 BY MR. PLACITELLA:</p> <p>21 Q In fact, it pertains directly to the</p> <p>22 Argonaut Mine in Vermont, correct?</p> <p>23 MR. FROST: Same objection.</p> <p>24 THE WITNESS: Where do you see that?</p> <p>25 BY MR. PLACITELLA:</p>

<p style="text-align: right;">Page 86</p> <p>1 Q Sure. If you go to the very next page, 2 under "Tremolite," do you see where it talks right 3 down at the bottom about the Argonaut and Black 4 Bear mines? 5 A I see that paragraph, yes. 6 Q And so this is about the mine. We 7 agree? 8 MR. FROST: Objection to form. 9 THE WITNESS: It appears to be so, yes. 10 BY MR. PLACITELLA: 11 Q And this particular report was not 12 provided to you along with the Pooley report for 13 information related to the mines that supplied 14 talc for Johnson & Johnson products, correct? 15 MR. FROST: Again, objection to form. 16 Mischaracterizes the document. 17 THE WITNESS: The document was not 18 provided to me. 19 BY MR. PLACITELLA: 20 Q Okay. So in this report the author 21 states: "Vermont talcs are derived from altered 22 serpentine - a natural host for asbestiform 23 minerals." Do you see that? 24 A I do. 25 MR. FROST: Same objection.</p>	<p style="text-align: right;">Page 88</p> <p>1 THE WITNESS: I have no idea what he 2 means by "fibrous." I don't know this person, I 3 don't know what his qualifications are, and I know 4 nothing about his terminology use. 5 BY MR. PLACITELLA: 6 Q Okay. And it says: "Cyprus staff 7 report past tremolite from the Hammondsville and 8 Clifton deposits." 9 Do you know anything about that? 10 MR. FROST: Objection to form. 11 THE WITNESS: No. 12 MR. PLACITELLA: Okay. Now -- first, 13 let me give this to your counsel, because I only 14 have two copies. 15 MR. FROST: I'm just generally going to 16 object to the use of this document -- 17 MR. PLACITELLA: Mm-hmm. 18 MR. FROST: -- as it's not a document 19 that has been created or provided by Johnson & 20 Johnson. I believe this was created by 21 plaintiffs' counsel. 22 MR. PLACITELLA: Actually, it was 23 created by Dr. Hopkins at this deposition, but 24 we'll fight that battle for another day. 25 MR. FROST: So Dr. Hopkins typed this</p>
<p style="text-align: right;">Page 87</p> <p>1 BY MR. PLACITELLA: 2 Q Do you agree with that statement? 3 A I don't think so, no. 4 Q Okay. And why do you disagree with that 5 statement? 6 A The term "altered serpentine" is a very 7 broad term, and so I don't really know how one can 8 just use the term "altered serpentine" and assume 9 that you would conclude that it's a host for 10 asbestiform mineral. 11 Q Okay. According to the author of this 12 report, he states: "There is certainly visible 13 tremolite and actinolite in specific zones of the 14 Vermont deposits - fibrous tremolite was 15 identified by the writer in exposures and cores at 16 the East Argonaut and Black Bear mines." 17 Do you see that? 18 A I do. 19 MR. FROST: Objection to form, and 20 again, it mischaracterizes the document. 21 BY MR. PLACITELLA: 22 Q Do you have any information in your 23 possession provided to you by Johnson & Johnson to 24 contradict that statement? 25 MR. FROST: Objection to form.</p>	<p style="text-align: right;">Page 89</p> <p>1 out at his deposition; is that -- 2 MR. PLACITELLA: Actually, what happened 3 was -- 4 MR. FROST: -- what relevance for the 5 record? 6 MR. PLACITELLA: -- we did it at the 7 deposition. Then you and Dr. Hopkins went in a 8 room and made some changes to the deposition -- to 9 the chart, and then we came back out and we went 10 through the chart with Dr. Hopkins to make his 11 corrections. 12 MR. FROST: Well, given the -- 13 MR. PLACITELLA: So -- but we'll let 14 the -- we'll deal with that another day. 15 MR. FROST: But given that I was not at 16 Dr. Hopkins' deposition, you know, that statement 17 certainly isn't fully accurate, but -- 18 MR. PLACITELLA: Okay. 19 MR. FROST: -- I just want to lodge my 20 objection for the record. This is not a document 21 that was produced by or provided by Johnson & 22 Johnson. 23 MR. PLACITELLA: Okay. 24 MR. FROST: Feel free to use it, but I 25 have an objection for the record.</p>

<p style="text-align: right;">Page 90</p> <p>1 MR. PLACITELLA: Okay.</p> <p>2 MR. LOCKE: And I was at the deposition,</p> <p>3 and I object to the characterization.</p> <p>4 MR. PLACITELLA: Okay. Okay.</p> <p>5 I just want to show you the end of the</p> <p>6 deposition, so if you think I'm mischaracterizing</p> <p>7 anything.</p> <p>8 Can we go to the ELMO?</p> <p>9 THE VIDEOGRAPHER: I can switch it.</p> <p>10 MR. PLACITELLA: Okay. Here is</p> <p>11 Dr. Hopkins' testimony.</p> <p>12 MR. FROST: Again, I object to the use</p> <p>13 of the video that's not directed as a question to</p> <p>14 the witness, but --</p> <p>15 (Audio played):</p> <p>16 MR. PLACITELLA: So let me</p> <p>17 ask you the question. Do you need</p> <p>18 time to take a break, Dr. Hopkins,</p> <p>19 and look at Hopkins 28 and see if</p> <p>20 any of the additions or deletions</p> <p>21 that were made by this -- on the</p> <p>22 chart today are inaccurate as</p> <p>23 reflected in your testimony?</p> <p>24 MR. BICKS: Again, I'll</p> <p>25 just object, and that's the</p>	<p style="text-align: right;">Page 92</p> <p>1 (Conclusion of audio being</p> <p>2 played.)</p> <p>3 MR. FROST: So I actually think that</p> <p>4 supports my objection, and my objection stands on</p> <p>5 the record.</p> <p>6 MR. PLACITELLA: That's fine.</p> <p>7 MR. FROST: And thank you for showing</p> <p>8 that.</p> <p>9 MR. PLACITELLA: I just want to make</p> <p>10 sure the record is clear.</p> <p>11 BY MR. PLACITELLA:</p> <p>12 Q So let's look at this chart together.</p> <p>13 Shall we?</p> <p>14 The chart has a number of columns. One</p> <p>15 is the date, the exhibit number, the testing</p> <p>16 entity, who the author was, the recipient, the</p> <p>17 purpose, the test method, the mine if we knew what</p> <p>18 it was, what exactly was tested, any special</p> <p>19 preparations, what the tests revealed, any</p> <p>20 comments from Dr. Hopkins, and whether -- and it's</p> <p>21 cut off, but I represent to you, whether according</p> <p>22 to Dr. Hopkins the test -- the results satisfied</p> <p>23 Johnson & Johnson's definition of "asbestos." Do</p> <p>24 you see this?</p> <p>25 MR. FROST: Again, I'm going to object</p>
<p style="text-align: right;">Page 91</p> <p>1 witness's not -- job is not to do</p> <p>2 that, and he need not do it.</p> <p>3 BY MR. PLACITELLA:</p> <p>4 Q. Okay. Do you need to</p> <p>5 do that?</p> <p>6 A. I'm not going to -- no,</p> <p>7 I'll take my attorney's advice and</p> <p>8 I will -- I will not do it. But</p> <p>9 I'll leave this exhibit as being a</p> <p>10 product of this deposition.</p> <p>11 Q. Okay. Well, it was not</p> <p>12 the product of this -- just this</p> <p>13 deposition. It's a product of a</p> <p>14 number of days, correct?</p> <p>15 A. Yes, this deposition</p> <p>16 and the -- the three days that we</p> <p>17 -- or four days that we have</p> <p>18 spent --</p> <p>19 Q. Correct.</p> <p>20 A. -- putting this chart</p> <p>21 together.</p> <p>22 Q. Correct.</p> <p>23 A. It is a product of this</p> <p>24 deposition.</p> <p>25 Q. Okay. Thank you.</p>	<p style="text-align: right;">Page 93</p> <p>1 to the characterization of the document.</p> <p>2 BY MR. PLACITELLA:</p> <p>3 Q Okay. So let's just walk through -- in</p> <p>4 light of the fact that Johnson & Johnson gave you</p> <p>5 an unpublished report of Pooley to rely upon, I</p> <p>6 just want to go through this chart and be clear as</p> <p>7 to whether any of the reports referenced on this</p> <p>8 chart as related to the mines alone -- not end</p> <p>9 products, okay? Are you with me?</p> <p>10 A Okay. Sort of.</p> <p>11 Q -- were provided to you.</p> <p>12 MR. FROST: Objection to form.</p> <p>13 BY MR. PLACITELLA:</p> <p>14 Q Okay. So the first entry on this chart</p> <p>15 is from 1957 by Battelle -- Battelle related to</p> <p>16 Italian talc, that was not provided to you, I take</p> <p>17 it, correct?</p> <p>18 MR. FROST: Objection to form.</p> <p>19 THE WITNESS: No.</p> <p>20 BY MR. PLACITELLA:</p> <p>21 Q Okay. The report from 1968 from</p> <p>22 Battelle concerning Val Chisone where they found</p> <p>23 tremolite was not provided to you, correct?</p> <p>24 MR. FROST: Objection to form.</p> <p>25 THE WITNESS: No.</p>

<p style="text-align: right;">Page 94</p> <p>1 BY MR. PLACITELLA:</p> <p>2 Q Okay. The 5/28/1958 report from</p> <p>3 Johnson & Johnson from Battelle concerning Val</p> <p>4 Chisone where they found 6 tremolite and 6 to</p> <p>5 10 percent fibrous talc, that was not provided to</p> <p>6 you, correct?</p> <p>7 MR. FROST: Objection to form.</p> <p>8 THE WITNESS: No.</p> <p>9 BY MR. PLACITELLA:</p> <p>10 Q Okay. The December 4th, 1970 report</p> <p>11 from the Colorado School of Mines concerning the</p> <p>12 Hammondsville mine's core samples finding</p> <p>13 tremolite, actinolite, and fibrous talc, that was</p> <p>14 not provided to you, correct?</p> <p>15 MR. FROST: Objection to form.</p> <p>16 THE WITNESS: No.</p> <p>17 BY MR. PLACITELLA:</p> <p>18 Q Okay. I want to skip all the ones that</p> <p>19 talk about just what they found in products.</p> <p>20 The report from 1971, July 7th, Colorado</p> <p>21 School of Mines on Vermont talc, that was not</p> <p>22 provided to you, correct?</p> <p>23 MR. FROST: Objection to form.</p> <p>24 THE WITNESS: No.</p> <p>25 BY MR. PLACITELLA:</p>	<p style="text-align: right;">Page 96</p> <p>1 identified chrysotile at a level less than 10</p> <p>2 parts per million in the Vermont sample satisfying</p> <p>3 Johnson & Johnson's definition of "asbestos," that</p> <p>4 was not provided to you, correct?</p> <p>5 MR. FROST: Objection to form.</p> <p>6 THE WITNESS: The document was not</p> <p>7 provided.</p> <p>8 BY MR. PLACITELLA:</p> <p>9 Q Okay. The March 1970 report from</p> <p>10 Dartmouth University concerning ore from the</p> <p>11 Windsor mine was not provided to you, correct?</p> <p>12 MR. FROST: Objection.</p> <p>13 THE WITNESS: It was not provided.</p> <p>14 BY MR. PLACITELLA:</p> <p>15 Q Do you see where I -- Dr. Hopkins</p> <p>16 actually put in his column he has issues with the</p> <p>17 conclusions in this report?</p> <p>18 MR. FROST: Objection to form.</p> <p>19 THE WITNESS: I see that.</p> <p>20 BY MR. PLACITELLA:</p> <p>21 Q Okay. The 4/24/74 report from McCrone,</p> <p>22 that's the one we just went through, right, where</p> <p>23 they say the purpose was whether or not there was</p> <p>24 any significant content of asbestiform materials</p> <p>25 in the Argonaut, and they found chrysotile and</p>
<p style="text-align: right;">Page 95</p> <p>1 Q And certainly you were not provided the</p> <p>2 report from McCrone from 1971 finding chrysotile</p> <p>3 asbestos in the Shower to Shower satisfying</p> <p>4 Johnson & Johnson's definition of "asbestos," that</p> <p>5 was never given to you because that was not of the</p> <p>6 mine, correct?</p> <p>7 MR. FROST: Objection to form.</p> <p>8 THE WITNESS: It was not provided.</p> <p>9 BY MR. PLACITELLA:</p> <p>10 Q Okay. Let's go to the next page.</p> <p>11 So skipping down to 1973, the 5/1/73</p> <p>12 report concerning Hammondsville ore, that was not</p> <p>13 provided to you, correct?</p> <p>14 MR. FROST: Objection.</p> <p>15 THE WITNESS: No.</p> <p>16 BY MR. PLACITELLA:</p> <p>17 Q Okay. The May 8, 1973 report concerning</p> <p>18 the Hammondsville ore, that was not provided to</p> <p>19 you, correct?</p> <p>20 MR. FROST: Objection to form.</p> <p>21 THE WITNESS: No.</p> <p>22 BY MR. PLACITELLA:</p> <p>23 Q The 1973 report from the Colorado School</p> <p>24 of Mines that examined for chrysotile and/or</p> <p>25 tremolite using TEM in Vermont samples, and</p>	<p style="text-align: right;">Page 97</p> <p>1 tremolite, which Dr. Hopkins said satisfied the</p> <p>2 Johnson & Johnson definition of "asbestos," that</p> <p>3 was not provided to you, correct?</p> <p>4 MR. FROST: Objection.</p> <p>5 THE WITNESS: The document was not</p> <p>6 provided.</p> <p>7 BY MR. PLACITELLA:</p> <p>8 Q Okay. The 5/8/74 report from McCrone</p> <p>9 using an optical microscope and TEM on the Windsor</p> <p>10 ore, and do you see where Dr. Hopkins says here</p> <p>11 "possible contamination of one test," that was not</p> <p>12 provided to you, correct?</p> <p>13 MR. FROST: Objection to form.</p> <p>14 BY MR. PLACITELLA:</p> <p>15 Q I mean, I'm showing you the good and the</p> <p>16 bad, so I'm not leaving anything out.</p> <p>17 A It was not provided.</p> <p>18 MR. FROST: Objection.</p> <p>19 BY MR. PLACITELLA:</p> <p>20 Q Okay. Do you see the next report from</p> <p>21 McCrone concerning the Argonaut ore body, where it</p> <p>22 says "chrysotile fibers in ore and product in</p> <p>23 one-third of the samples tested," that was not</p> <p>24 provided to you, correct?</p> <p>25 MR. FROST: Objection to form.</p>

<p style="text-align: right;">Page 98</p> <p>1 THE WITNESS: The document was not 2 provided. 3 BY MR. PLACITELLA: 4 Q Okay. The report from May 14th, '74, 5 from McCrone and Dartmouth concerning the 6 Hammondsville mine, that was not provided to you, 7 correct? 8 MR. FROST: Objection. 9 THE WITNESS: The document was not 10 provided. 11 BY MR. PLACITELLA: 12 Q By the way, do you have that 89 -- 13 that J&J 89 in front of you? 14 A I'm sorry. Is this something you've 15 given to me before? 16 Q Yes -- yes, ma'am. It says "J&J 89" on 17 it. I just want to go back there for a second. 18 A Yes. Yes. 19 Q And if you -- I just put up here for -- 20 under Table 3, just where they describe what 21 they've seen based on the photomicrographs, that's 22 something that you do, correct? You look at 23 photomicrographs and you describe what you see? 24 A I -- I look at preparations under the 25 microscope.</p>	<p style="text-align: right;">Page 100</p> <p>1 provided. 2 (Exhibit J&J-97 was presented to 3 the witness.) 4 BY MR. PLACITELLA: 5 Q Okay. And there's another report, 6 J&J-97, mentioned here from McCrone using TEM on 7 ore fibers of asbestos, according to Dr. Hopkins 8 satisfies Johnson & Johnson's definition of 9 "asbestos," that was never provided to you, 10 correct? 11 MR. FROST: Objection to form. 12 THE WITNESS: I'm not sure exactly what 13 you're referring to, but the document, whatever it 14 was, was not provided. 15 (Exhibit Hopkins 28 was presented 16 to the witness.) 17 BY MR. PLACITELLA: 18 Q Okay. I'm sorry to have to do this, but 19 I have to make a record. Given the fact, ma'am, 20 just -- Doctor, just so you know, you were 21 provided some documents and not others, and all I 22 want to do is make a record here of the 23 information you were not provided. 24 Are you with me? 25 MR. FROST: Objection to form.</p>
<p style="text-align: right;">Page 99</p> <p>1 Q Okay. And you see here where it talks 2 about the HC sample: "Two bundles of amphiboles, 3 two single amphibole fibers." See that? 4 A I do. 5 Q All right. That would even satisfy your 6 definition of "asbestos," right? 7 MR. FROST: Objection. 8 THE WITNESS: I'm sorry, but I don't 9 have any idea what criteria he was using to 10 identify it as amphibole or -- 11 BY MR. PLACITELLA: 12 Q Okay. Well, let's go back then to the 13 chart. 14 Under that same Exhibit J&J 89 where it 15 says: "Determine the extent of amphibole or 16 serpentine contamination. We kept a running 17 tabulation of the asbestos we could possibly 18 identify." 19 And in the chart, it says: "Confirmed 20 asbestos, low to medium bundles of amphiboles," 21 and according to Dr. Hopkins, that satisfied 22 Johnson & Johnson's definition of "asbestos." 23 That report was never provided to you, correct? 24 MR. FROST: Objection to form. 25 THE WITNESS: The document was not</p>	<p style="text-align: right;">Page 101</p> <p>1 THE WITNESS: I hear you. 2 BY MR. PLACITELLA: 3 Q Okay. Now, there is a report here -- 4 you were given a report from Dr. Pooley from 1972. 5 Do you recall that? 6 A Yes. 7 Q Okay. And in this chart there's a 8 report from 1977 from Dr. Pooley on the Vermont 9 samples where he found fibers of antigorite. That 10 was not provided to you, correct? 11 MR. FROST: Objection to form. 12 THE WITNESS: It was not. 13 BY MR. PLACITELLA: 14 Q Okay. The internal report of Johnson & 15 Johnson from 2/9/1974 of the 66 composite samples 16 finding tremolite and actinolite, that was not 17 provided to you, correct? 18 MR. FROST: Objection to form. 19 THE WITNESS: I don't know where you 20 are, but no. 21 BY MR. PLACITELLA: 22 Q Okay, ma'am, I'm right here 23 (indicating). I'm not -- I'm not -- now I'm on 24 the fourth entry down. 25 In 9/1/83, there was another McCrone</p>

<p style="text-align: right;">Page 102</p> <p>1 report to test for airborne fiber concentrations 2 at the Argonaut and Rainbow Mines finding 118 3 fibers -- no, I'm sorry -- 118 fibers in Argonaut, 4 2,650 fibers in Rainbow, satisfying the Johnson & 5 Johnson definition of "asbestos," that was not 6 provided to you, correct? 7 MR. FROST: Objection to form. 8 THE WITNESS: The document was not 9 provided. 10 BY MR. PLACITELLA: 11 Q Okay. In terms of your conclusions 12 related to Italian talc, there was a report from 13 1985 to Olson on the Italian talc done in South 14 Plainfield, where they found 71.2 percent fibrous 15 talc and 5.8 percent anthophyllite and asbestiform 16 amphibole satisfying Johnson & Johnson's 17 definition of "asbestos," that document was not 18 provided to you, correct? 19 MR. FROST: Objection to form. 20 THE WITNESS: It was not. 21 BY MR. PLACITELLA: 22 Q Okay. I'll just go -- I won't go 23 through the conclusion. 24 The -- J&J-184, the 8/5/1986 report from 25 McCrone concerning Hammondsville air samples, that</p>	<p style="text-align: right;">Page 104</p> <p>1 MR. FROST: Objection to form. 2 THE WITNESS: The document was not 3 provided. 4 BY MR. PLACITELLA: 5 Q I'm almost done, I promise. 6 These are all on products. Okay. 7 Down here in 1961, a report from 8 Battelle on the Hammondsville core, that was not 9 provided to you, correct? 10 MR. FROST: Objection to form. 11 THE WITNESS: The document was not 12 provided. 13 BY MR. PLACITELLA: 14 Q Okay. The 1991 reports concerning the 15 Argonaut and Hamm Mines, they were not provided to 16 you either, correct? 17 MR. FROST: Objection to form. 18 THE WITNESS: The documents were not 19 provided. 20 BY MR. PLACITELLA: 21 Q Okay. And am I correct in order for you 22 to determine whether those -- all the reports that 23 we went through would be relevant to your 24 assessment about whether it was likely or not that 25 there would be asbestos in the mine sources for</p>
<p style="text-align: right;">Page 103</p> <p>1 wasn't provided to you, correct? 2 MR. FROST: Objection to form. 3 THE WITNESS: The document was not 4 provided. 5 BY MR. PLACITELLA: 6 Q Okay. We already went through the 7 Cyprus reports, so I won't do that. 8 The 2/9/1979 report -- internal report 9 from Johnson & Johnson related to Windsor, six 10 composite samples, that was not provided to you, 11 correct? 12 MR. FROST: Objection to form. 13 THE WITNESS: The document was not 14 provided. 15 BY MR. PLACITELLA: 16 Q Okay. The 1958 -- May 9th, 1958 report 17 from Battelle concerning the Italian talc, that 18 was not provided to you, correct? 19 MR. FROST: Objection to form. 20 THE WITNESS: The document was not 21 provided. 22 BY MR. PLACITELLA: 23 Q Okay. The 1/24/58 report from Battelle 24 concerning Italian talc, that was not provided to 25 you, correct?</p>	<p style="text-align: right;">Page 105</p> <p>1 Johnson & Johnson talc, you would actually have to 2 see the reports and make that determination, 3 correct? 4 MR. FROST: Objection to form. 5 THE WITNESS: The request by Johnson & 6 Johnson for me was to review the literature, the 7 two mine reports, and the lab results from 8 Drs. Longo and Rigler. 9 BY MR. PLACITELLA: 10 Q Well, do you think it's fair to you as 11 the person who is asked to give an opinion to 12 this -- in this case, for Johnson & Johnson to 13 give you some non-published reports but not all of 14 the non-published reports for you to make your own 15 determination as an expert as to whether they 16 would be relevant to your opinions? 17 MR. FROST: Objection to form. 18 BY MR. PLACITELLA: 19 Q Do you think that's fair? 20 A The reports that they provided were 21 helpful because they were a complete assessment of 22 the mine, samples from the footwall, the hanging 23 wall, the ore body, throughout the deposit. And 24 those reports from Pooley or from his group at 25 Cardiff were -- were relevant.</p>

<p style="text-align: right;">Page 106</p> <p>1 I couldn't follow everything that you</p> <p>2 were saying, but these appeared to be primarily</p> <p>3 composites or air samples or things that really</p> <p>4 don't relate to the geology of the mine.</p> <p>5 BY MR. PLACITELLA:</p> <p>6 Q Okay. But you don't know without</p> <p>7 actually looking at the report.</p> <p>8 A That would be correct.</p> <p>9 MR. FROST: Objection to form.</p> <p>10 THE WITNESS: I said only from what you</p> <p>11 provided.</p> <p>12 MR. FROST: And are you going to move on</p> <p>13 from --</p> <p>14 MR. PLACITELLA: Yep.</p> <p>15 MR. FROST: -- this line of questioning?</p> <p>16 MR. PLACITELLA: Yeah.</p> <p>17 MR. FROST: So I just want to lodge</p> <p>18 another general objection, and move to strike all</p> <p>19 of the questioning that related to Hopkins 28, as</p> <p>20 I can't verify here today that the various</p> <p>21 assumptions and assertions made in this document</p> <p>22 are accurate regarding the various underlying</p> <p>23 things.</p> <p>24 MR. PLACITELLA: Well, I would have</p> <p>25 hoped that you would have read the deposition at</p>	<p style="text-align: right;">Page 108</p> <p>1 Q So I'm just going to ask you --</p> <p>2 THE VIDEOGRAPHER: iPad?</p> <p>3 MR. PLACITELLA: Sure.</p> <p>4 BY MR. PLACITELLA:</p> <p>5 Q Do you agree with the definition on the</p> <p>6 screen: "Asbestos is defined to be fibrous</p> <p>7 serpentine, chrysotile, and the fibrous forms of</p> <p>8 the amphibole group as represented by amosite,</p> <p>9 anthophyllite, chrysotile, tremolite, asbestos and</p> <p>10 actinolite"?</p> <p>11 Do you agree with that definition?</p> <p>12 MR. FROST: Objection to form.</p> <p>13 THE WITNESS: No.</p> <p>14 BY MR. PLACITELLA:</p> <p>15 Q Okay. So as you sit here today, you'll</p> <p>16 understand that you are testifying that you</p> <p>17 disagree with the definition of "asbestos" of</p> <p>18 Johnson & Johnson. Did you know that?</p> <p>19 MR. FROST: Objection to form.</p> <p>20 THE WITNESS: No.</p> <p>21 MR. PLACITELLA: Give me a second.</p> <p>22 BY MR. PLACITELLA:</p> <p>23 Q Okay. Do you disagree with the</p> <p>24 definition put up on the screen: "Asbestos is</p> <p>25 defined to be fibrous serpentine and chrysotile,</p>
<p style="text-align: right;">Page 107</p> <p>1 some point in time, since he was actually taken on</p> <p>2 the very subject of what was in Johnson & Johnson</p> <p>3 files and what, according to his own chart says,</p> <p>4 the tests revealed. But we'll go through that</p> <p>5 another day. So --</p> <p>6 MR. FROST: I'm just making my objection</p> <p>7 for the record.</p> <p>8 MR. PLACITELLA: Okay.</p> <p>9 BY MR. PLACITELLA:</p> <p>10 Q Now, part of your opinions --</p> <p>11 MR. PLACITELLA: What time do you want</p> <p>12 to break for lunch, by the way, just so I can do</p> <p>13 some timing?</p> <p>14 MR. FROST: It's up to Dr. Wylie. I</p> <p>15 mean, I think we're fairly flexible.</p> <p>16 THE WITNESS: I'm not hungry.</p> <p>17 MR. PLACITELLA: That's fine.</p> <p>18 MR. FROST: There we go.</p> <p>19 BY MR. PLACITELLA:</p> <p>20 Q Okay. Part of your opinions in this</p> <p>21 case focus on what you believe is an acceptable</p> <p>22 definition of "asbestos," correct?</p> <p>23 MR. FROST: Objection to form.</p> <p>24 THE WITNESS: Correct.</p> <p>25 BY MR. PLACITELLA:</p>	<p style="text-align: right;">Page 109</p> <p>1 and the fibrous forms of amphibole group as</p> <p>2 represented by amosite, anthophyllite,</p> <p>3 crocidolite, tremolite and actinolite"? Do you</p> <p>4 agree with that definition?</p> <p>5 MR. FROST: Objection to form.</p> <p>6 THE WITNESS: No.</p> <p>7 BY MR. PLACITELLA:</p> <p>8 Q I put up that definition of "fiber" from</p> <p>9 the -- directly from OSHA's website. And it</p> <p>10 states: "Fiber means a particulate form of</p> <p>11 asbestos 5 micrometers or longer with a length-to-</p> <p>12 diameter ratio of at least 3 to 1."</p> <p>13 Do you agree with that definition?</p> <p>14 A That is the NIOSH definition.</p> <p>15 Q All right. Do you agree with that</p> <p>16 definition?</p> <p>17 A It is not the way I would use the term</p> <p>18 "fiber."</p> <p>19 Q So you disagree with it?</p> <p>20 A Yes.</p> <p>21 Q Okay. Do you know what TSCA is? TSCA</p> <p>22 acronym, do you know what it is?</p> <p>23 A Toxic Substance Control Act.</p> <p>24 Q Right. And you know that that was an</p> <p>25 act of Congress attempting to control hazards in</p>

<p style="text-align: right;">Page 110</p> <p>1 the environment?</p> <p>2 MR. FROST: Objection to form.</p> <p>3 THE WITNESS: Not -- I'm -- not really.</p> <p>4 BY MR. PLACITELLA:</p> <p>5 Q Okay.</p> <p>6 A I -- I couldn't verify what you said.</p> <p>7 Q Okay. I want to show you the definition</p> <p>8 from TSCA and ask you if you agree with it.</p> <p>9 It says: "Section 202 defines</p> <p>10 'asbestos' as the asbestiform varieties of six</p> <p>11 fiber types: Chrysotile (serpentine), crocidolite</p> <p>12 (riebeckite), amosite" --</p> <p>13 Can you give me that? I can't say that</p> <p>14 one.</p> <p>15 A Cumingtonite-grunerite.</p> <p>16 Q Very good. You get an A for that one.</p> <p>17 -- anthophyllite, tremolite or</p> <p>18 actinolite."</p> <p>19 The latter five fiber types are</p> <p>20 amphibole varieties. Do you see that? Do you</p> <p>21 agree with that definition?</p> <p>22 A I do.</p> <p>23 MR. FROST: Objection to form.</p> <p>24 And again, I'll generally object to the</p> <p>25 use of these documents that we're putting up on</p>	<p style="text-align: right;">Page 112</p> <p>1 I've learned a lot. So my guess is that my papers</p> <p>2 would reflect an evolution in my thinking.</p> <p>3 Q Okay. So what I would like to do, at</p> <p>4 least before lunch, is at least get down what your</p> <p>5 definition actually is. Because I was kind of</p> <p>6 having a hard time looking at it from your report,</p> <p>7 and I looked a lot of your articles.</p> <p>8 So can we just go over, and I'll try to</p> <p>9 write slowly and correct, get my spelling right of</p> <p>10 what your -- your, Ann Wylie's, current definition</p> <p>11 is, and I'll write it down. So we're all</p> <p>12 walking -- working from the same sheet of music,</p> <p>13 okay?</p> <p>14 All right. So let's start.</p> <p>15 A You can write the TSCA definition down.</p> <p>16 I'm happy with that.</p> <p>17 Q You're -- well, why don't we just write</p> <p>18 down what your definition is, Ann Wylie.</p> <p>19 A The asbestiform varieties" --</p> <p>20 Q Okay.</p> <p>21 A -- of six regulated minerals.</p> <p>22 Chrysotile.</p> <p>23 Q Uh-huh.</p> <p>24 A Anthophyllite.</p> <p>25 Q Oh, yeah.</p>
<p style="text-align: right;">Page 111</p> <p>1 the screen. We're not getting context of where</p> <p>2 they're coming from, what they are, whether</p> <p>3 they're regulations, whether they come from the</p> <p>4 federal regulations, whether they're printoffs of</p> <p>5 websites. So I'll just generally lodge an</p> <p>6 objection to the use of the documents in this</p> <p>7 manner.</p> <p>8 MR. PLACITELLA: Okay.</p> <p>9 BY MR. PLACITELLA:</p> <p>10 Q Has -- has your definition of what</p> <p>11 constitutes a countable asbestos fiber under the</p> <p>12 microscope changed at all over time?</p> <p>13 MR. FROST: Objection to form.</p> <p>14 THE WITNESS: I don't believe I have a</p> <p>15 countable definition.</p> <p>16 BY MR. PLACITELLA:</p> <p>17 Q All right. Okay. Has your definition</p> <p>18 of "fiber" -- "asbestos fiber" changed over time?</p> <p>19 MR. FROST: Objection to form.</p> <p>20 THE WITNESS: Perhaps.</p> <p>21 BY MR. PLACITELLA:</p> <p>22 Q Okay. When you say "perhaps," what do</p> <p>23 you mean by that?</p> <p>24 A Well, I -- I don't remember precisely,</p> <p>25 but certainly over a course of my life's work,</p>	<p style="text-align: right;">Page 113</p> <p>1 A Would you like me to spell it for you?</p> <p>2 Q You want to see if I can do it.</p> <p>3 Two Ts, right?</p> <p>4 A No.</p> <p>5 Q Go ahead.</p> <p>6 A Grunerite.</p> <p>7 Q Oh, forget it. You want to write it</p> <p>8 down?</p> <p>9 A Grunerite.</p> <p>10 Q Okay. Anthophyllite.</p> <p>11 Spell grunerite.</p> <p>12 A Grunerite.</p> <p>13 Q Go ahead.</p> <p>14 A G-R-U-N-E-R-I-T-E.</p> <p>15 Q Okay.</p> <p>16 A Tremolite.</p> <p>17 Q Mm-hmm.</p> <p>18 A Actinolite.</p> <p>19 And what have I left out? No, it should</p> <p>20 be -- chrysotile and -- anthophyllite -- no, you</p> <p>21 have that.</p> <p>22 Q We already did that.</p> <p>23 A Chrysotile, anthophyllite, grunerite --</p> <p>24 oh, riebeckite.</p> <p>25 Q Spell that one.</p>

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<p>1 A R-I-E-B-E-C-K-I-T-E.</p> <p>2 Q That's it?</p> <p>3 A Yes.</p> <p>4 Q Okay. Now, just so we're clear, what is</p> <p>5 this the definition of?</p> <p>6 A Regulated minerals.</p> <p>7 Q Of regulated minerals.</p> <p>8 A It's the definition of "asbestos."</p> <p>9 Q Okay. Now, are there certain things</p> <p>10 that you look at under a microscope to determine</p> <p>11 whether what you're seeing satisfies this</p> <p>12 definition? What do you look for?</p> <p>13 A Yes.</p> <p>14 Q And what is that? By the way, has that</p> <p>15 changed over time?</p> <p>16 A No.</p> <p>17 Q Okay. So we'll just -- tell me what you</p> <p>18 need.</p> <p>19 A I believe we need to be more specific</p> <p>20 than microscope.</p> <p>21 Q Okay. What do you need?</p> <p>22 A A polarized light microscope.</p> <p>23 Q Nothing else?</p> <p>24 A Well, we could start there.</p> <p>25 Q Okay. So PLM. Is that fair?</p>	<p>1 A One of the --</p> <p>2 Q -- mentioned before?</p> <p>3 A Yes, mm-hmm.</p> <p>4 Q So one of the recognized minerals?</p> <p>5 A One of the minerals I listed before.</p> <p>6 Q Okay. I'm going to need space to go</p> <p>7 back and fill it in.</p> <p>8 Go ahead. What else? Four -- I'm on</p> <p>9 four now.</p> <p>10 A You've turned your chart over, so --</p> <p>11 Q Here. Hold on. I want to make sure.</p> <p>12 Fiber bundles. Composed of fibrils.</p> <p>13 Needs to be one of the minerals.</p> <p>14 A I would say an abundance of high aspect</p> <p>15 ratio particles.</p> <p>16 Q Okay. Four, abundance of high aspect</p> <p>17 ratio particles.</p> <p>18 Anything else?</p> <p>19 A I think that would be the criteria I</p> <p>20 would apply.</p> <p>21 Q Okay.</p> <p>22 A There are other criteria that can be</p> <p>23 added, and which I have listed elsewhere which we</p> <p>24 can add if you'd like, but it -- they're not a</p> <p>25 necessary criterion.</p>
Page 115	Page 117
<p>1 A Yes.</p> <p>2 Q Okay. What do we need?</p> <p>3 A We need to see the presence of fiber</p> <p>4 bundles.</p> <p>5 Q Okay. So, one, fiber bundles.</p> <p>6 Two?</p> <p>7 A Composed of fibrils of a narrow width.</p> <p>8 Q When you say "narrow width," what --</p> <p>9 what's the width?</p> <p>10 A Normally less than 0.5 micrometers.</p> <p>11 Q Okay. Less than 0.5 micrometers?</p> <p>12 A Yes.</p> <p>13 Q Okay. Now, when you say "fiber</p> <p>14 bundles," what do you mean by that?</p> <p>15 A I mean --</p> <p>16 Q You know what, let's just get it down,</p> <p>17 and then we'll go back. Okay?</p> <p>18 So composed of fibrils of narrow width.</p> <p>19 A That's correct.</p> <p>20 Q Less than 5 -- 0.5?</p> <p>21 A 0.5.</p> <p>22 Q Okay, 0.5. What else?</p> <p>23 A They need to be one of the -- one of the</p> <p>24 minerals.</p> <p>25 Q One of the minerals you --</p>	<p>1 Q So -- well, let's put "not necessary,"</p> <p>2 and then we'll keep going. Okay? Also but not</p> <p>3 necessary. Okay.</p> <p>4 A Fibers showing curvature.</p> <p>5 Q Okay.</p> <p>6 A Matted masses --</p> <p>7 Q My handwriting is horrible. I should</p> <p>8 have had Leigh do this.</p> <p>9 Go ahead.</p> <p>10 A Matted masses of fibers.</p> <p>11 Q Okay.</p> <p>12 A Anomalous optical properties.</p> <p>13 Q Oh, boy, we'll spend some time on that</p> <p>14 one. Anomalous --</p> <p>15 A -- optical properties.</p> <p>16 Q Okay.</p> <p>17 A And those are actually normally present.</p> <p>18 Anomalous optical properties can be observed. So</p> <p>19 I could move that --</p> <p>20 Q So they're normally present?</p> <p>21 A Yes. I could put that to the upper</p> <p>22 list.</p> <p>23 Q Oh, you're kidding. Okay. Move it to</p> <p>24 five?</p> <p>25 A Mm-hmm.</p>

<p style="text-align: right;">Page 118</p> <p>1 Q All right. Okay. Is that it?</p> <p>2 A Sure.</p> <p>3 Q Would you find it disrespectful if I</p> <p>4 took my jacket off? It's very hot in here.</p> <p>5 A No.</p> <p>6 Q Good thing I didn't wear my Terps scarf.</p> <p>7 All right. Does the term "population"</p> <p>8 belong anywhere in these criteria?</p> <p>9 A Under the optical microscope, these</p> <p>10 refer to observations you might make about a</p> <p>11 population of particles that have a single mineral</p> <p>12 identity.</p> <p>13 Q Okay.</p> <p>14 A So they don't all have to be present in</p> <p>15 a single particle.</p> <p>16 Q Okay. So how would -- where do you want</p> <p>17 me to put "population," under five?</p> <p>18 MR. FROST: Can you move it over so we</p> <p>19 can see?</p> <p>20 THE WITNESS: I'm sorry, but I don't</p> <p>21 think -- I -- you know, you are trying to put this</p> <p>22 in a way -- I would lay at the beginning to say</p> <p>23 that "in a population of asbestos, one would</p> <p>24 normally find," so that way we can begin --</p> <p>25 BY MR. PLACITELLA:</p>	<p style="text-align: right;">Page 120</p> <p>1 Okay. Can you give me that, please?</p> <p>2 A It -- asbestiform applies to fibrils of</p> <p>3 very narrow width that occur in parallel bundles.</p> <p>4 Q Okay.</p> <p>5 A Bundles of parallel fibers, I should put</p> <p>6 it that way.</p> <p>7 Q Fibers of very narrow width --</p> <p>8 A -- in bundles that share an axis of</p> <p>9 elongation that are --</p> <p>10 Q Chair?</p> <p>11 A Share.</p> <p>12 Q Oh, share.</p> <p>13 A Share.</p> <p>14 Q Okay.</p> <p>15 A An axis of -- axis of elongation.</p> <p>16 Q Okay.</p> <p>17 A But are randomly oriented in the other</p> <p>18 crystallographic directions.</p> <p>19 Q Randomly oriented --</p> <p>20 A -- in the other crystallographic</p> <p>21 directions.</p> <p>22 Q Tell me how you spell crystallographic,</p> <p>23 and what --</p> <p>24 A C-R-Y- --</p> <p>25 Q Yeah.</p>
<p style="text-align: right;">Page 119</p> <p>1 Q Okay. Okay. So I'll put here -- you</p> <p>2 didn't know I was going to make you work this</p> <p>3 hard, right?</p> <p>4 Okay. So let's go back now for each</p> <p>5 term, and we can do this up till lunch, and then</p> <p>6 we'll -- I'm sure you'll by that time be hungry.</p> <p>7 Okay. So let's just talk about your</p> <p>8 first term, your first requirement, fiber bundles.</p> <p>9 MR. FROST: I was going to say, Chris,</p> <p>10 why don't we take a short break now, we've been</p> <p>11 going for a little over an hour --</p> <p>12 MR. PLACITELLA: Mm-hmm.</p> <p>13 MR. FROST: -- and then we can jump into</p> <p>14 this, and then we'll do lunch after that.</p> <p>15 MR. PLACITELLA: That's fine.</p> <p>16 THE VIDEOGRAPHER: The time is 11:42</p> <p>17 a.m. We're going off the record.</p> <p>18 (Recess.)</p> <p>19 THE VIDEOGRAPHER: The time is 11:57</p> <p>20 a.m., and we're back on the record.</p> <p>21 BY MR. PLACITELLA:</p> <p>22 Q Okay. I wanted to define one term that</p> <p>23 we did not specifically define, and that is your</p> <p>24 definition of "asbestiform." And then we'll</p> <p>25 get in -- go back.</p>	<p style="text-align: right;">Page 121</p> <p>1 A -- S-T-A-L-L-O-G-R-A-P-H-I-C.</p> <p>2 Q Okay. Crystallographic --</p> <p>3 A -- directions.</p> <p>4 Q -- directions. Okay.</p> <p>5 That sounds like an after-lunch -- okay.</p> <p>6 So let's talk about how you define, and</p> <p>7 what we went through before, "population," so we</p> <p>8 have that down.</p> <p>9 A A number of the same particles of the</p> <p>10 same type in some way, defined in common -- by a</p> <p>11 common definition of some sort.</p> <p>12 Q A number of particles -- go ahead.</p> <p>13 A Defined in some way.</p> <p>14 Q In some way.</p> <p>15 A Right. A population of dogs is all</p> <p>16 composed of dogs.</p> <p>17 Q Okay. So how many particles do you need</p> <p>18 for a population? Is two enough?</p> <p>19 MR. FROST: Objection to form.</p> <p>20 THE WITNESS: I -- I don't really have</p> <p>21 an answer for that. I've never tried to restrict</p> <p>22 it in that way. And I've never seen something</p> <p>23 with just two particles in it that --</p> <p>24 BY MR. PLACITELLA:</p> <p>25 Q Well, is three enough to become a</p>

<p style="text-align: right;">Page 122</p> <p>1 population? Four?</p> <p>2 A It depends.</p> <p>3 MR. FROST: Objection to form.</p> <p>4 BY MR. PLACITELLA:</p> <p>5 Q So as you sit here today, you can't tell</p> <p>6 me the number of particles that would satisfy your</p> <p>7 definition of "population"?</p> <p>8 A No, because it depends upon what the</p> <p>9 defining characteristic is.</p> <p>10 Q Okay. Well, if I have two dogs, is that</p> <p>11 a population of dogs?</p> <p>12 A Hmm.</p> <p>13 Q Or do I need three dogs?</p> <p>14 MR. FROST: Objection to form.</p> <p>15 THE WITNESS: I -- you want more than</p> <p>16 that based on the variety of dogs there are out</p> <p>17 there.</p> <p>18 BY MR. PLACITELLA:</p> <p>19 Q Okay. So if it's all one kind of dog,</p> <p>20 that's not a population?</p> <p>21 A It would be a population of that kind of</p> <p>22 dog.</p> <p>23 Q So if it was like -- I like Golden</p> <p>24 Retrievers. So if I have three Golden Retrievers,</p> <p>25 that's a population of Golden Retrievers?</p>	<p style="text-align: right;">Page 124</p> <p>1 this, so if you see I'm really screwing up on</p> <p>2 spelling, just tell me because I don't want to be,</p> <p>3 you know, accused like a Dan Quail at some point.</p> <p>4 Okay. So common axis of --</p> <p>5 A -- elongation.</p> <p>6 Q Okay. What else?</p> <p>7 A I suppose you would have to say in a --</p> <p>8 in a particle or in an entity or something -- in a</p> <p>9 particle.</p> <p>10 Q In a particle.</p> <p>11 A I have to say I'm not exactly used to</p> <p>12 writing things like this on the fly. I usually</p> <p>13 spend a lot of time to make sure my definitions</p> <p>14 are quite rigorous.</p> <p>15 Q Well, I'm actually going --</p> <p>16 A It's not so easy under these</p> <p>17 circumstances.</p> <p>18 Q Well, I hear you, but I'm trying -- I'm</p> <p>19 actually going slow, one, so I can understand what</p> <p>20 you're saying.</p> <p>21 A Mm-hmm.</p> <p>22 Q And, two, so you take your time because</p> <p>23 it's going on a record.</p> <p>24 A Yes.</p> <p>25 Q So by me being a little slow on the</p>
<p style="text-align: right;">Page 123</p> <p>1 A I don't know -- would you say you had a</p> <p>2 population of Golden Retrievers if --</p> <p>3 Q I've had four, yeah.</p> <p>4 A Did you refer to them as a population?</p> <p>5 Q I don't know. I'm using your term.</p> <p>6 A Well, I've never applied it to dogs.</p> <p>7 Q Well, you just did.</p> <p>8 A I did, but I -- I was just being</p> <p>9 facetious.</p> <p>10 Q Okay. So --</p> <p>11 A I don't have a definition. The United</p> <p>12 States Geological Survey recommends that you --</p> <p>13 you should look at several hundred particles to</p> <p>14 define a "population." So they have a definition.</p> <p>15 But I don't think I've ever --</p> <p>16 Q Okay.</p> <p>17 A -- tried to narrow it down in that way.</p> <p>18 Q Okay. Now, you said "fiber bundles."</p> <p>19 What do you mean by "fiber," and what do you mean</p> <p>20 by "bundles"?</p> <p>21 A Bundles are groups of fibers that share</p> <p>22 a common axis of elongation and -- but are easily</p> <p>23 separable from one another.</p> <p>24 Q Groups of fibers that share common axis</p> <p>25 of -- you got to do me a favor. People might read</p>	<p style="text-align: right;">Page 125</p> <p>1 uptake gives you the opportunity to make sure you</p> <p>2 have the record the way you want it. Okay?</p> <p>3 So -- so you say -- and then you say</p> <p>4 "fiber," how do you define "fiber"?</p> <p>5 A A particle that attains its shape</p> <p>6 through growth, formed in nature in that way.</p> <p>7 Q Fiber. Okay. Tell me -- say it again.</p> <p>8 A May I say there are more than one</p> <p>9 definition of "fiber."</p> <p>10 Q Well, I want just your definition.</p> <p>11 A Well, I -- I'm telling you there's more</p> <p>12 than one definition of "fiber." So there are</p> <p>13 definitions of "fiber" that apply to counting</p> <p>14 criteria that the government identifies as fiber.</p> <p>15 So that's the set of definitions. So you're not</p> <p>16 asking me for that.</p> <p>17 Q No. I want your definition.</p> <p>18 A So for me, a fiber is a particle that</p> <p>19 attains -- it's long, thin, and attained its shape</p> <p>20 in nature.</p> <p>21 Q Long, thin, and attained its shape in</p> <p>22 nature.</p> <p>23 A And we refer to that as growing, but I</p> <p>24 don't want to confuse that with a plant where a</p> <p>25 geologist could say it grew that way.</p>

<p style="text-align: right;">Page 126</p> <p>1 Q Okay. So you say a particle that is 2 long and thin. What do you mean by long? 3 A With respect to its width. Long with 4 respect to its width. 5 Q So you don't have a -- 6 A No. 7 Q -- length in mind? 8 A No. 9 Q Okay. So long with respect to its 10 width. Is there a ratio or something that you 11 need? 12 A No. 13 Q So, long equals long width with respect 14 to its width. 15 And what do you mean by thin? 16 A Thin with respect to its length. 17 Q Any particular width that you're -- 18 A No. 19 Q Okay. So thin with respect to its 20 length. 21 Okay. And can I put for both of these 22 no particular measurement? 23 A Yes. 24 Q No particular length or width, no 25 particular measurement?</p>	<p style="text-align: right;">Page 128</p> <p>1 A Could we -- could we go back? We're 2 talking about the -- again, we're now back not to 3 the definition of "fiber," but to the definition 4 of "asbestos" under the microscope. Let's be 5 clear what we're speaking about. 6 Q Right. I'm going under -- for what you 7 require, what you look for under the microscope. 8 A All right. 9 Q And you said, "Composed of fibrils of 10 narrow width." 11 A Yes. 12 Q Okay. So I just want to make sure I got 13 it down. 14 A Yes. 15 Q Go ahead. Is it less than 5 microns? 16 Is that what you mean? 17 A That would be -- less than 5 microns? 18 No. 19 Q 0.5 microns. I'm sorry. 20 A Well -- yes. 21 Q Okay. So narrow width equals less than 22 0.5 microns? 23 A For optical microscopy. 24 Q You mean under a PLM? 25 A Yes.</p>
<p style="text-align: right;">Page 127</p> <p>1 A Well, no, there -- there are sort of 2 natural restrictions. You don't tend to find 3 fibers in nature that are, you know, 5 centimeters 4 across. 5 Q Right. 6 A But -- no. 7 Q Okay. So then you say, "Composed of 8 fibrils of narrow width." Okay. What do you mean 9 by "fibril"? 10 A That's the smallest particle in an 11 asbestos bundle. It's a single crystal or it may 12 be twinned. 13 Q Well, can you actually get down to a 14 final fibril in an asbestos -- when you're talking 15 about asbestos? 16 A By polarized light microscopy? 17 Q Yeah. 18 A You can't usually see the individual 19 fibrils, although if they're, you know, a little 20 bit on the wider side. But normally you don't see 21 the individual fibrils. You see groups of 22 fibrils. 23 Q Okay. And -- and you -- you say of 24 narrow -- fibrils of narrow width. What do you 25 mean by that, narrow width?</p>	<p style="text-align: right;">Page 129</p> <p>1 Q Okay. You say -- are we talking about 2 one of the regulated minerals? 3 I'll go back and write them down over 4 lunch, okay, so we don't have to do that now. 5 You say, "Abundance of high aspect ratio 6 particles." What do you mean by "abundance"? 7 A What do I mean by "abundance"? Well -- 8 Q More than one dog? 9 A More than one dog. 10 Q So "abundance" means more than one? 11 A More than one. 12 Q Okay. Of high aspect ratio -- well, 13 let's start with particles. What do you mean by 14 particles? 15 A A piece of a mineral or a piece of 16 composite minerals. I mean, it's -- a particle is 17 just a particle. We can look these up in the 18 dictionary. They're not geologic terms. 19 "Particle" is not a geologic term. 20 Q Well, I'm just trying to understand -- 21 A That's fine. 22 Q Okay. And then high aspect ratio, what 23 do you mean by that? Let me write that down. 24 A Well, I -- I have published 20-to-1. 25 That would be high aspect ratio.</p>

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1 Q Okay. I've also seen publications of
 2 yours listing 100-to-1. Where does that come
 3 from?
 4 A Well, you can find asbestos particles
 5 that are 100-to-1.
 6 Q But it's not a requirement of yours if
 7 yours is 20-to-1?
 8 A Those would be abundant. If -- those
 9 would be abundant in the population.
 10 Q Okay.
 11 A Mm-hmm.
 12 Q So you'd want more than one 20-to-1
 13 particle.
 14 MR. FROST: Objection to form.
 15 THE WITNESS: I'm a little unclear. But
 16 if we define a "population" as being a number of
 17 particles of similar mineral type, and you need to
 18 have an abundance within that population of high
 19 aspect ratio particles. I have actually published
 20 mean aspect ratios of 20-to-1 or greater -- yeah,
 21 mean.
 22 BY MR. PLACITELLA:
 23 Q Okay. So in a population, what
 24 percentage of the particles would you need to be
 25 greater than 20-to-1 in order to satisfy your

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1 definition?
 2 A I would never apply that kind of
 3 criteria. You could have bundles that are 3-to-1.
 4 Q I'm sorry. I'm not sure I understand.
 5 You said you could have bundles that are
 6 3-to-1?
 7 A Yes.
 8 Q But that wouldn't satisfy your --
 9 A Yes, it's a bundle. It's a bundle.
 10 Q Okay. So that's what I'm trying to
 11 understand. In your population --
 12 A Yes.
 13 Q -- what percentage of the particles --
 14 right?
 15 A Yes.
 16 Q -- need to be greater than 20-to-1?
 17 A The mean -- what I -- I have published
 18 statements that say that the mean aspect ratio is
 19 20-to-1 or higher.
 20 Q Mm-hmm.
 21 A And those are of known asbestos
 22 materials.
 23 Q Okay.
 24 A So those characteristics are for the
 25 asbestos that I've looked at.

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1 Q Okay. But you said an abundance, which
 2 is more than one, of minerals --
 3 A Much more than one.
 4 Q Okay.
 5 A I mean you were trying to tell me that I
 6 only needed two. I think I --
 7 Q No, I --
 8 A -- I need much more than that.
 9 Q Well, I'm just going by what you said.
 10 That's why I wrote it down slowly.
 11 A Yes. Okay.
 12 Q So is three dogs enough?
 13 A Well, greater than one is -- could be a
 14 thousand, couldn't it?
 15 Q But it could be two dogs.
 16 A But I would never call on two dogs.
 17 Q Well, how many dogs do we need before
 18 you -- it satisfies your definition?
 19 A Well, you have to be --
 20 MR. FROST: Objection to form.
 21 THE WITNESS: You have to be quite
 22 careful to make sure that you have sufficient
 23 information, and that really depends on -- it
 24 really depends. I can't really quite answer that.
 25 BY MR. PLACITELLA:

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1 Q Okay. When you have published that you
 2 need aspect ratios of 100-to-1, what did you mean
 3 by that?
 4 A I've never said that was a requirement.
 5 Q Never?
 6 A No.
 7 Q Okay. Now, you say this was not
 8 required, right, fibers showing curvature?
 9 A That's not required.
 10 Q Okay. So I'm going to put first under
 11 here, "Not required."
 12 Okay. And what do you mean by "showing
 13 curvature"?
 14 A That the particles are not straight.
 15 Q Okay. This -- this requirement doesn't
 16 apply to tremolite, does it?
 17 A It applies --
 18 MR. FROST: Objection to form.
 19 THE WITNESS: It applies to all
 20 asbestos. What are we -- I'm sorry. What do you
 21 mean --
 22 BY MR. PLACITELLA:
 23 Q Well, you don't usually get fibers with
 24 curvature if you're looking at tremolite, correct?
 25 A It depends on whether it's asbestiform

<p style="text-align: right;">Page 134</p> <p>1 tremolite or not.</p> <p>2 Q So if you see asbestiform tremolite,</p> <p>3 you -- you usually see curvature?</p> <p>4 A You can see it.</p> <p>5 MR. FROST: Objection to form.</p> <p>6 BY MR. PLACITELLA:</p> <p>7 Q But not always.</p> <p>8 A It's true of all asbestos, not always.</p> <p>9 Q Okay. Then matted masses of fibers.</p> <p>10 What do you mean by "matted masses"? Not</p> <p>11 required, right?</p> <p>12 A No.</p> <p>13 Q Okay. So let me write here, "Not</p> <p>14 required." Okay. Okay. Matted masses.</p> <p>15 You promise you won't make fun of me</p> <p>16 when you leave here today, right?</p> <p>17 A Promise.</p> <p>18 Q Okay. "Matted masses," what is that?</p> <p>19 A These are populations --</p> <p>20 characteristics, I'm sorry, that I've observed in</p> <p>21 some asbestos samples where the -- when you see it</p> <p>22 looking at it under the optical microscope, they</p> <p>23 appear to be intertwined as though they were --</p> <p>24 "interwoven" might be the right term.</p> <p>25 Q Okay. And when you say "masses," what</p>	<p style="text-align: right;">Page 136</p> <p>1 A As I said before, I have never seen --</p> <p>2 Q Okay. So --</p> <p>3 A -- populations of asbestos in which the</p> <p>4 optical properties --</p> <p>5 Q So I should say expected but not</p> <p>6 required?</p> <p>7 A I have never seen a population where the</p> <p>8 properties of asbestos -- where the properties are</p> <p>9 not anomalous.</p> <p>10 Q Okay. What --</p> <p>11 A Should we go through what optical</p> <p>12 properties are?</p> <p>13 Q Yeah, I'm going to do that.</p> <p>14 A All right.</p> <p>15 Q I'm just -- first, I want to understand</p> <p>16 whether it's, in your definition, required.</p> <p>17 That's all. If it's expected but not required,</p> <p>18 I'll write that. But I just want to make sure I</p> <p>19 have it down.</p> <p>20 A And I'd say again, I've never seen</p> <p>21 samples that don't have it.</p> <p>22 Q So do you require it?</p> <p>23 A Well, you know, I guess, so maybe I</p> <p>24 would. Although I have to say that if I see fiber</p> <p>25 bundles and so forth, I may not check the -- this</p>
<p style="text-align: right;">Page 135</p> <p>1 do you mean by that?</p> <p>2 A A particle.</p> <p>3 Q Okay.</p> <p>4 A That contains these numerous fibers that</p> <p>5 are intergrown and intertwined.</p> <p>6 Q By the way, just so -- because I know</p> <p>7 this will go in a record, when I'm all done, I'll</p> <p>8 let you check my work, okay? So we...</p> <p>9 Now, you say "anomalous optical</p> <p>10 properties."</p> <p>11 A Yes.</p> <p>12 Q What do you mean by that?</p> <p>13 A Well, there are a number. The</p> <p>14 interference --</p> <p>15 Q This is required?</p> <p>16 A I have -- I don't think I can think of</p> <p>17 an instance where I have looked at asbestos and</p> <p>18 not seen anomalous optical properties.</p> <p>19 Q So your -- do you require it or don't</p> <p>20 require it?</p> <p>21 A I expect it.</p> <p>22 Q You expect it but not required.</p> <p>23 A I expect it.</p> <p>24 Q It's kind of like dealing with your</p> <p>25 kids.</p>	<p style="text-align: right;">Page 137</p> <p>1 optical properties because I know they'll be</p> <p>2 anomalous.</p> <p>3 Q Okay. So what do I write?</p> <p>4 A I don't know.</p> <p>5 Q Okay. You don't want me to put a</p> <p>6 question mark.</p> <p>7 A I -- I tried to explain to you as best I</p> <p>8 can.</p> <p>9 Q All right, I'll put a question mark.</p> <p>10 Expected but not always checked for?</p> <p>11 A But not -- well, this is complicated.</p> <p>12 I'm trying to think back. It's been a</p> <p>13 long time since I've analyzed any asbestos. The</p> <p>14 optical properties are anomalous in asbestos. So</p> <p>15 under PLM, I would look for them.</p> <p>16 Q So --</p> <p>17 A If they're not there, I think I would</p> <p>18 not necessarily assume it was asbestos. So let's</p> <p>19 put it required.</p> <p>20 Q Required.</p> <p>21 A Required.</p> <p>22 Q I'll tell you what, you have until the</p> <p>23 end of lunch to change your mind. How's that?</p> <p>24 A All right.</p> <p>25 Q Okay. Tell me what an anomalous optical</p>

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1 property is.
 2 A All right. For every mineral, there's a
 3 set of properties that can be evaluated by
 4 polarized light microscopy. Would you like me to
 5 give you a list?
 6 Q Well, just give me an example -- oh,
 7 you're going to give me a list for every mineral?
 8 A No. No. There's a set of
 9 measurements --
 10 Q Okay.
 11 A -- that are called optical properties.
 12 Q Give it to me.
 13 A All right. The angle of extinction.
 14 The sign of elongation.
 15 Q Hold on.
 16 A All right, I'll go slower.
 17 Q You are just playing with me now. Okay.
 18 Okay. What is it?
 19 A Sign of elongation.
 20 Q Mm-hmm.
 21 A Size of 2V.
 22 Q Size of 2V?
 23 A 2V. Two, capital V.
 24 Q Okay. Okay.
 25 A The optic sign.

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1 Q Okay.
 2 A Birefringence. Position of the optic
 3 plane.
 4 Q Don't get impatient. I'm writing as
 5 fast I can. I feel like you're getting a little
 6 impatient.
 7 MR. FROST: Objection to form.
 8 MR. PLACITELLA: You won't be the first
 9 person that got impatient.
 10 BY MR. PLACITELLA:
 11 Q Okay.
 12 A Indices -- principal indices of
 13 refraction.
 14 Pleochroism.
 15 Q Oh, come on.
 16 A P-L --
 17 Q P-L --
 18 A -- E-O --
 19 Q -- E-O --
 20 A -- C-H --
 21 Q -- C-H --
 22 A -- R --
 23 Q Uh-huh.
 24 A -- O-I-S-M.
 25 Dispersion of the optic axis.

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1 Q Mm-hmm.
 2 A Could you put it so I could see?
 3 Q Oh, sorry.
 4 A Let me just make sure I haven't
 5 forgotten anything.
 6 Q Sorry.
 7 A I think -- I think that's --
 8 Q You know what, I'll let you look at it
 9 at lunchtime.
 10 A I think that's it.
 11 Q Okay. All right. Now --
 12 A Oh, one more.
 13 Oh, I have that, sign of extinction.
 14 Sorry.
 15 Q Okay. So I want to talk about the
 16 aspect ratio.
 17 A Okay.
 18 Q Okay. Does your position as it relates
 19 to the aspect ratio conflict with OSHA's position?
 20 MR. FROST: Objection to form.
 21 THE WITNESS: OSHA has criteria for
 22 counting asbestos fiber that do not conform to
 23 20-to-1. But I am not saying that you must have
 24 20-to-1, only that they are abundant.
 25 BY MR. PLACITELLA:

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1 Q So -- but under OSHA's definition, you
 2 could have abundant at 3-to-1, and that would
 3 satisfy their definition, correct --
 4 MR. FROST: Object.
 5 BY MR. PLACITELLA:
 6 Q -- but not yours?
 7 MR. FROST: Objection to form.
 8 THE WITNESS: That satisfies their
 9 counting criterion, yes, in occupational
 10 monitoring.
 11 BY MR. PLACITELLA:
 12 Q But it wouldn't satisfy your criteria
 13 for determining that you were looking at an
 14 asbestiform fiber?
 15 MR. FROST: Objection to form. We're
 16 talking about two very different things here.
 17 THE WITNESS: OSHA's definition applies
 18 to occupational monitoring, and in that context,
 19 they determined that they were going to count for
 20 exposure assessments in environments where
 21 asbestos is known to occur, particles that are
 22 3-to-1. That's what they -- longer than 5.
 23 BY MR. PLACITELLA:
 24 Q Mm-hmm.
 25 A That -- that is the way they approach

<p style="text-align: right;">Page 142</p> <p>1 the analysis of the abundance of asbestos. I have</p> <p>2 never considered it to be a definition for</p> <p>3 "asbestos."</p> <p>4 Q Okay. But when you're counting, you</p> <p>5 require seeing an abundance of particles greater</p> <p>6 than 20-to-1 aspect ratio, correct?</p> <p>7 A I don't count.</p> <p>8 MR. FROST: Objection to form.</p> <p>9 BY MR. PLACITELLA:</p> <p>10 Q Okay. You don't count.</p> <p>11 A I don't count.</p> <p>12 Q Okay. What do you do?</p> <p>13 A I look in a -- the discussion we</p> <p>14 began --</p> <p>15 Q Yes, ma'am.</p> <p>16 A -- was if I have a sample and I want --</p> <p>17 of material, minerals --</p> <p>18 Q Mm-hmm.</p> <p>19 A -- and I want to know if the sample is</p> <p>20 asbestos or isn't it --</p> <p>21 Q Mm-hmm.</p> <p>22 A -- then I look for these characteristics</p> <p>23 as a group to determine whether or not it's</p> <p>24 asbestos or asbestos is present.</p> <p>25 Q Okay. So I looked at the -- and I want</p>	<p style="text-align: right;">Page 144</p> <p>1 MR. FROST: I was going to say, if you</p> <p>2 want, Dr. Wylie, we can pull -- we can try to find</p> <p>3 a copy of it somewhere if you want to look at the</p> <p>4 whole document.</p> <p>5 THE WITNESS: Perhaps we could see what</p> <p>6 questions he has, and if I need to look at the</p> <p>7 document, I can do that then.</p> <p>8 BY MR. PLACITELLA:</p> <p>9 Q You have a table in your article</p> <p>10 entitled "The length, width and aspect ratio for</p> <p>11 some selected asbestos samples."</p> <p>12 A Yes.</p> <p>13 Q Do you see that?</p> <p>14 A Yes, mm-hmm.</p> <p>15 Q And one of the minerals that you analyze</p> <p>16 was amosite, correct?</p> <p>17 A These are not my data.</p> <p>18 Q It's in your article.</p> <p>19 A Yes, but they're all referenced.</p> <p>20 They're from other sources. I've never done lung</p> <p>21 tissue analysis. These are not my data. They're</p> <p>22 literature data.</p> <p>23 Q Okay. Well, let's just go through it.</p> <p>24 A Sure.</p> <p>25 Q These are data you relied upon in</p>
<p style="text-align: right;">Page 143</p> <p>1 to go over it with you -- I looked at NIOSH's own</p> <p>2 report, and it looked to me that if you used a</p> <p>3 20-to-1 aspect ratio, you would miss most</p> <p>4 tremolite asbestos.</p> <p>5 MR. FROST: Objection to form.</p> <p>6 BY MR. PLACITELLA:</p> <p>7 Q Is that fair?</p> <p>8 A I really don't know what you're</p> <p>9 referring to. I'm sorry.</p> <p>10 Q Okay. I'll go back to 30 after lunch.</p> <p>11 You did a paper -- I'm missing a whole</p> <p>12 folder.</p> <p>13 MR. PLACITELLA: Can you go to the --</p> <p>14 THE VIDEOGRAPHER: iPad?</p> <p>15 MR. PLACITELLA: -- iPad, please.</p> <p>16 THE VIDEOGRAPHER: Yes, sir.</p> <p>17 BY MR. PLACITELLA:</p> <p>18 Q So I have a paper here by you entitled</p> <p>19 "Membrane Filter Method for Estimating Asbestos</p> <p>20 Fiber Exposure." Do you see that?</p> <p>21 A Yes.</p> <p>22 Q Okay. Do you recall that paper?</p> <p>23 A Yes.</p> <p>24 Q Okay. I'll blow up the pieces I want to</p> <p>25 ask you about. And --</p>	<p style="text-align: right;">Page 145</p> <p>1 publishing your paper, though.</p> <p>2 A These are data I published.</p> <p>3 Q Okay. And --</p> <p>4 A I referenced.</p> <p>5 Q Right. And you have data here on</p> <p>6 amosite, correct?</p> <p>7 A Yes.</p> <p>8 Q That by any definition is "asbestos,"</p> <p>9 right?</p> <p>10 A Yes.</p> <p>11 Q Okay. So then you -- in this data you</p> <p>12 have not just lung tissue but an analysis of bulk</p> <p>13 samples and samples, you know, that came out of</p> <p>14 the mine, correct?</p> <p>15 A The --</p> <p>16 Q It says "bagging" --</p> <p>17 A Yes, these are data. They're from</p> <p>18 Pooley and Clark or Gibson, Wang. I'm not sure --</p> <p>19 I can't remember where they came from, but, yes,</p> <p>20 they -- they did lung tissue, air -- air analysis.</p> <p>21 Q Okay.</p> <p>22 A Yes, yes, mm-hmm.</p> <p>23 Q Okay. So if I go to the aspect ratio</p> <p>24 for this data -- so, for example, I go to the</p> <p>25 aspect ratio for bagging.</p>

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1 A Yes.

2 Q Do you see that?

3 A Yes, mm-hmm.

4 Q Okay. That's this (indicating). It

5 says that 32 percent is greater than 17-to-1.

6 A Yes, it says, yes.

7 Q Okay. So that meant that -- what

8 percent was less than 17-to-1?

9 A A math test.

10 MR. FROST: Objection to form.

11 THE WITNESS: Less than or equal, I

12 would guess --

13 BY MR. PLACITELLA:

14 Q Less than or equal.

15 A -- 68.

16 Q So 68 percent of the amosite asbestos

17 under your definition would not be counted?

18 MR. FROST: Objection to form.

19 Misstates the document and what she's been

20 testifying to today.

21 MR. PLACITELLA: Please, only form.

22 Please. Don't do that.

23 MR. FROST: And that's why I said I

24 would really like her to have a copy of the

25 article in front of her because you keep blowing

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1 up portions of it so we can't see what the

2 actual chart says, and then you're asking her

3 questions.

4 MR. PLACITELLA: No, I want to -- here,

5 here's the whole chart. Hold on. I'll blow up

6 the whole chart.

7 THE WITNESS: I -- I understand the

8 question. I feel all right in answering it.

9 BY MR. PLACITELLA:

10 Q Okay. So my question is, that 68

11 percent of the asbestos in this chart for this

12 sample is less than 20-to-1, correct?

13 A Yes, could you remove the -- what you

14 just put up and let me look at the full dataset?

15 Q Sure.

16 A You see, it says mean length, 2.53. It

17 also says it was done by TEM, and it also says

18 it's an air sample. We've been talking about

19 polarized light microscopy and bulk sample

20 analysis and particles that are longer than 5

21 micrometers. So this is not relevant to our

22 conversation.

23 Q Well, in your article you're counting as

24 asbestos 68 percent of a sample less than a

25 20-to-1 aspect ratio, correct?

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1 A I don't apply those definitions to air

2 samples. We're talking about bulk sample analysis

3 by polarized light microscopy.

4 Q Okay.

5 A This is entirely a different kettle of

6 fish. It's a different method of analysis and

7 there are different criteria.

8 We were talking about polarized light

9 microscopy. All of these are air data, lung data.

10 Q Well, actually not, it doesn't say air

11 data. You see where it says, "Mine TEM"?

12 A Yes, but I know that it's air data.

13 Q How do you know?

14 A Because I know where it came from.

15 Q Okay. So if it's air data, then your

16 criteria don't apply?

17 A The criteria that we were discussing

18 apply to polarized light microscopy examination of

19 bulk materials. You've switched topic and taking

20 me to TEM analysis of air samples, and they are

21 not comparable. And there's no limit on the

22 width, so that that is also not comparable.

23 Q Okay. So everything you said in this

24 entire pad that we just went through only applies

25 if you're taking a bulk sample using PLM?

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1 A That's correct. That's what we were

2 discussing.

3 Q Okay. So your -- your opinion is not,

4 for example, that if you use TEM, and you look at

5 a sample, that you need a 20-to-1 aspect ratio in

6 order to call something asbestos?

7 MR. FROST: Objection to form.

8 BY MR. PLACITELLA:

9 Q Correct?

10 A Correct.

11 Q Okay. I want to talk to you now about

12 fiber width. Because maybe we're just -- maybe I

13 was a little confused, and you're straightening me

14 out. Okay?

15 A Good.

16 Q Okay. Am I correct that under your

17 definition, under PLM, that any fiber bundle

18 greater than 5 microns, you do not count?

19 MR. FROST: Objection to form.

20 THE WITNESS: I don't count. Any fiber

21 bundle I would assume would be evidence for the

22 presence of asbestos, provided the fibrils were

23 small.

24 BY MR. PLACITELLA:

25 Q Okay. So -- why don't we -- wait, let

<p style="text-align: right;">Page 150</p> <p>1 me get your -- I'm glad we wrote all this down. 2 So you said here -- maybe I should 3 have -- "composed of fibrils of narrow width less 4 than 0.5." Correct? 5 A By PLM, yes. 6 Q By PLM. And if you look at it and it's 7 greater than 0.5, then it doesn't satisfy your 8 definition? 9 MR. FROST: Objection to form. 10 BY MR. PLACITELLA: 11 Q Even if -- even if it's in a bundle? 12 MR. FROST: Objection to form. 13 BY MR. PLACITELLA: 14 Q Well, this is what I'm trying to 15 understand. Okay? 16 A Well, try again. 17 Q And you have to bear with me. 18 A Yeah, that's fine. 19 Q Okay? 20 You're saying that it has to be composed 21 of fibrils of narrow width? 22 A That's correct. 23 Q When you look at something under PLM, 24 you can't always tell if it -- if it's fibrils 25 composed of fibrils under 0.5 if there are</p>	<p style="text-align: right;">Page 152</p> <p>1 A Yes. 2 Q Okay. How do you make that 3 determination? 4 A The properties become anomalous. 5 Q Okay. So if you look at it and you see 6 something above 0.5, what does that tell you? 7 A It tells me there's a particle above 0.5 8 in -- on the slide. 9 Q But you can't tell whether that's 10 asbestos? 11 MR. FROST: Objection to form. 12 THE WITNESS: Again, I don't identify 13 particle by particle. If you get a sample and 14 it's labeled "asbestos," and you look at it under 15 the microscope, sometimes you might find a 16 particle. Some of the samples may have 17 contaminants of rock fragment from the area in 18 which it was mined. Some of them are composite. 19 I can't really say what's not; I'm 20 looking for what is. So it's the presence that's 21 being verified, not the absence. 22 BY MR. PLACITELLA: 23 Q Well, how many fibrils do we need to 24 look at, do we need to see -- 25 MR. FROST: Objection to form.</p>
<p style="text-align: right;">Page 151</p> <p>1 multiple fibrils making a bundle, correct? 2 A If they are less than 0.5, the -- the 3 result is an anomalous optical property. 4 Q Mm-hmm. But if it's above 0.5, then 5 you -- then you don't consider that asbestos? 6 MR. FROST: Objection to form. 7 BY MR. PLACITELLA: 8 Q If you see it under a microscope. 9 A Again, I don't look at a particle-by- 10 particle basis. It's not an appropriate approach. 11 Q Okay. So maybe we have to -- it says 12 here, "Composed of fibrils of narrow width." So 13 how many fibrils do we need? 14 A Well, when you have -- I'm talking about 15 bundles. So you -- 16 Q You said here "composed of fibrils." 17 A -- -brils, yes. Bundles are composed of 18 fibrils -- 19 Q Correct. 20 A -- in asbestos -- 21 Q Correct. 22 A -- of narrow width. Yes. 23 Q Correct. So composed of fibrils -- 24 A -- -brils. 25 Q -- of narrow width?</p>	<p style="text-align: right;">Page 153</p> <p>1 BY MR. PLACITELLA: 2 Q -- in order to conclude that it's 3 asbestos. 4 A I need to see a fiber bundle of material 5 that's smaller than 0.5 micrometers. 6 Q So you -- oh, so now -- now at least I 7 think I understand. 8 So when you say "composed of fibrils of 9 narrow width" -- 10 A Normally less than 0.5 I think is one of 11 the values. The word "normally." So... 12 Q That really should be composed of fiber 13 bundles less than 0.5. 14 A No, I think that -- 15 MR. FROST: Objection to form. 16 THE WITNESS: -- fiber bundle is what's 17 composed. That's where I think we're think- -- we 18 were talking. We were talking about fiber 19 bundles, and you asked me what they were, and I 20 said they were composed of fibrils of narrow 21 width. That's what fiber bundles are. 22 BY MR. PLACITELLA: 23 Q Okay. 24 A I believe that's the reason why it's 25 written in this way.</p>

<p style="text-align: right;">Page 154</p> <p>1 Q Okay. So maybe I have to rewrite it.</p> <p>2 A I don't know. I --</p> <p>3 Q So you're looking under a PLM</p> <p>4 microscope.</p> <p>5 A Yes.</p> <p>6 Q And you see a mineral.</p> <p>7 A Yes.</p> <p>8 Q Okay. And how do you determine whether</p> <p>9 that's a fibril or a bundle? How -- how do you</p> <p>10 know?</p> <p>11 A For most of what you see by polarized</p> <p>12 light microscopy, they're bundles.</p> <p>13 Q So are you able then to go to --</p> <p>14 A For asbestos.</p> <p>15 Q Okay. Are you then able to go to the</p> <p>16 individual fibrils and actually measure them?</p> <p>17 A No.</p> <p>18 Q So when you say "composed of fibrils</p> <p>19 less than 0.5," you really can't measure that.</p> <p>20 A You can measure 0.5, and you can see</p> <p>21 that they are less, but you can't measure how much</p> <p>22 less or what they are.</p> <p>23 Q All right. So if you see -- but you</p> <p>24 can't always see the fibrils if they're in a</p> <p>25 bundle. Correct?</p>	<p style="text-align: right;">Page 156</p> <p>1 Q Okay. And so something could go into</p> <p>2 the body greater than 0.5, but when it's in the</p> <p>3 body, break down to something less than that.</p> <p>4 MR. FROST: Objection --</p> <p>5 BY MR. PLACITELLA:</p> <p>6 Q Fair?</p> <p>7 MR. FROST: Objection to form.</p> <p>8 THE WITNESS: If -- you used the word</p> <p>9 "something." I'm sorry, I -- I can't --</p> <p>10 BY MR. PLACITELLA:</p> <p>11 Q An asbestos fiber bundle.</p> <p>12 A And we're discussing asbestos, are we</p> <p>13 not?</p> <p>14 Q Yes, ma'am.</p> <p>15 A All right. So in the case of asbestos,</p> <p>16 I think that that does definitely happen.</p> <p>17 Q Okay. Now, let's just talk about the --</p> <p>18 so I understand the capabilities here of PLM, what</p> <p>19 is the capability of PLM in terms of looking at</p> <p>20 the width of a fibril? What's -- what's its limit</p> <p>21 of detection?</p> <p>22 MR. LOCKE: Objection.</p> <p>23 THE WITNESS: There is -- there are</p> <p>24 two -- there are two measures: One is resolution,</p> <p>25 and the other is visibility. And they're not the</p>
<p style="text-align: right;">Page 155</p> <p>1 A You can -- you know they're there</p> <p>2 because of the anomalous properties.</p> <p>3 Q Okay.</p> <p>4 A Or the presence of the splayed ends. So</p> <p>5 there -- there are a number of ways you can get at</p> <p>6 it.</p> <p>7 Q Okay. But how do you know when you're</p> <p>8 looking at a bundle how many fibrils are in there?</p> <p>9 A You don't.</p> <p>10 Q You can't?</p> <p>11 A No.</p> <p>12 Q Okay. So -- and when those bundles are</p> <p>13 -- well, let me ask you this: Can you inhale</p> <p>14 fiber bundles that are greater than 0.5?</p> <p>15 MR. FROST: Objection to form.</p> <p>16 THE WITNESS: Are you asking me about</p> <p>17 the physiology of the lung?</p> <p>18 BY MR. PLACITELLA:</p> <p>19 Q Well, do you know?</p> <p>20 A I -- I think you can, yes.</p> <p>21 Q Okay. And if you have a fiber bundle</p> <p>22 that's greater than 0.5, does that have the</p> <p>23 potential to split into thinner fiber bundles</p> <p>24 inside the body?</p> <p>25 A Yes.</p>	<p style="text-align: right;">Page 157</p> <p>1 same.</p> <p>2 So the experiments -- and the visibility</p> <p>3 can't really be pre- -- predicted because it</p> <p>4 depends on the contrast and the index of</p> <p>5 refraction of the material with the substance that</p> <p>6 it's mounted in, and the higher that difference,</p> <p>7 the more visible small particles might become.</p> <p>8 So the literature of which I'm aware is</p> <p>9 that visibility of -- for example, I think that --</p> <p>10 I think it was crocidolite and -- crocidolite in</p> <p>11 particular, visibility is about 0.15.</p> <p>12 The resolution limit depends on the --</p> <p>13 the objective that you're using. Resolution is</p> <p>14 determined by the numerical aperture of the</p> <p>15 objective. And so that depends.</p> <p>16 I use a numerical aperture of 0.85. It</p> <p>17 also depends upon the wavelength of light. And so</p> <p>18 I consider probably something around 0.25 as</p> <p>19 resolution, ability to resolve, but it might be</p> <p>20 0.3 or 0.4.</p> <p>21 You know, resolution has a very</p> <p>22 technical -- technical meaning. I'd have to</p> <p>23 calculate it. I've sort of forgotten.</p> <p>24 Wavelength, 0.61 --</p> <p>25 BY MR. PLACITELLA:</p>

<p style="text-align: right;">Page 158</p> <p>1 Q You want to --</p> <p>2 A -- divided by a numerical aperture.</p> <p>3 I can calculate it.</p> <p>4 Q Okay.</p> <p>5 A Oh, I'm writing on your document.</p> <p>6 Q That's okay.</p> <p>7 A Sorry.</p> <p>8 Q So let me just spend a few --</p> <p>9 MR. PLACITELLA: What time do we have?</p> <p>10 We got another 15 minutes or do you want to stop</p> <p>11 now? You want to stop now? It's quarter to 1:00.</p> <p>12 MR. FROST: We may as well stop now and</p> <p>13 have lunch.</p> <p>14 MR. PLACITELLA: Okay. Okay.</p> <p>15 THE VIDEOGRAPHER: The time is 12:43</p> <p>16 p.m. We're going off the record.</p> <p>17 (Lunch recess.)</p> <p>18 (Wylie Exhibit No. AW-50 was</p> <p>19 marked for identification.)</p> <p>20 THE VIDEOGRAPHER: The time, it is</p> <p>21 1:43 p.m., and we are back on the record.</p> <p>22 BY MR. PLACITELLA:</p> <p>23 Q Okay. A few follow-up questions.</p> <p>24 We talked this morning about the 20-to-1</p> <p>25 aspect ratio that you required. Do you recall</p>	<p style="text-align: right;">Page 160</p> <p>1 literature for that topic.</p> <p>2 BY MR. PLACITELLA:</p> <p>3 Q But as you sit here today, you can't</p> <p>4 point to any peer-reviewed literature that adopts</p> <p>5 the 21 -- 20-to-1 aspect ratio as a geologic</p> <p>6 criteria, correct?</p> <p>7 MR. FROST: Objection to form.</p> <p>8 THE WITNESS: As I said, I'd have to</p> <p>9 review the literature from the Bureau of Mines</p> <p>10 before I could say -- answer that question.</p> <p>11 BY MR. PLACITELLA:</p> <p>12 Q Right, that's what I'm saying.</p> <p>13 But as you sit here today, you can't</p> <p>14 point to any peer-reviewed article, as you sit</p> <p>15 here today, that adopts your 20-to-1 criteria as a</p> <p>16 geologic definition, correct?</p> <p>17 MR. FROST: Object -- objection.</p> <p>18 THE WITNESS: You know, the -- I think</p> <p>19 the answer must be is it's -- I don't have</p> <p>20 citations in my head for that.</p> <p>21 BY MR. PLACITELLA:</p> <p>22 Q Well, do you have any authors --</p> <p>23 A I believe that --</p> <p>24 Q -- other than people who publish with</p> <p>25 you?</p>
<p style="text-align: right;">Page 159</p> <p>1 that?</p> <p>2 A Mean aspect ratio, yes.</p> <p>3 Q Mean aspect, okay. Is -- is that based</p> <p>4 upon any geologic criteria?</p> <p>5 A When it was first developed, we based it</p> <p>6 on just simply observations of many samples.</p> <p>7 Q Is it --</p> <p>8 A It's an empirical guide.</p> <p>9 Q Is the 20-to-1 aspect ratio published in</p> <p>10 any peer-reviewed journal other than a journal --</p> <p>11 an article that you authored?</p> <p>12 A It's part of the EPA working definition.</p> <p>13 It's published by the EPA.</p> <p>14 Q But they just took it from you, right?</p> <p>15 A I don't know that.</p> <p>16 MR. FROST: Objection to form.</p> <p>17 BY MR. PLACITELLA:</p> <p>18 Q So is there any peer-reviewed geological</p> <p>19 reference that you have, other than the EPA, that</p> <p>20 supports that 20-to-1 is a -- based on a geologic</p> <p>21 criteria?</p> <p>22 MR. FROST: Objection to form.</p> <p>23 THE WITNESS: I took -- to say "yes" or</p> <p>24 "no," the information out of the Bureau of Mines</p> <p>25 may well have included it. I'd have to review the</p>	<p style="text-align: right;">Page 161</p> <p>1 A Oh.</p> <p>2 MR. FROST: Objection.</p> <p>3 THE WITNESS: Again, I'd have to review</p> <p>4 the literature from the Bureau of Mines.</p> <p>5 BY MR. PLACITELLA:</p> <p>6 Q Okay. But as you sit here today,</p> <p>7 perhaps with the exception of something in the</p> <p>8 Bureau of Mines literature, you can't point to any</p> <p>9 peer-reviewed article or reference that adopts</p> <p>10 your 20-to-1 criteria as a geologic criteria.</p> <p>11 Correct?</p> <p>12 MR. FROST: Objection.</p> <p>13 THE WITNESS: As long as we exclude the</p> <p>14 Bureau of Mines, I can't think of anything.</p> <p>15 BY MR. PLACITELLA:</p> <p>16 Q Okay.</p> <p>17 A But I, you know, can't say it doesn't</p> <p>18 exist.</p> <p>19 Q And you don't know for sure about the</p> <p>20 Bureau of Mines.</p> <p>21 A I can't -- I think it's there, but --</p> <p>22 that's kind of my memory, but I really would have</p> <p>23 to look through the literature.</p> <p>24 Q Okay. When you did your searches --</p> <p>25 your research for today, you limited your searches</p>

<p style="text-align: right;">Page 162</p> <p>1 to what you term "geologic literature." You did</p> <p>2 not look at medical lecture -- medical literature,</p> <p>3 correct?</p> <p>4 A No. No.</p> <p>5 Q Okay. Now --</p> <p>6 A There is an article cited included in my</p> <p>7 list, which I did not actually end up using,</p> <p>8 that's medical. So I have to say that.</p> <p>9 Q Okay. Now, in this AW-30, which is your</p> <p>10 pad or our pad --</p> <p>11 A Your pad.</p> <p>12 Q -- will you look at it and make sure I</p> <p>13 got the text right?</p> <p>14 A I will look at it.</p> <p>15 Q Okay. And AW-30 -- or 50, I'm sorry,</p> <p>16 the criteria in here is premised on using PLM as</p> <p>17 the instrument, correct?</p> <p>18 A That's correct.</p> <p>19 Q Okay. And the opinions in your report</p> <p>20 are premised on using PLM as an -- as a -- as the</p> <p>21 method, correct?</p> <p>22 A Hmm. You -- are you asking me if I only</p> <p>23 looked at the PLM component of the Longo reports?</p> <p>24 Are you asking me that question?</p> <p>25 Q Well, how about that question.</p>	<p style="text-align: right;">Page 164</p> <p>1 of bulk insulation materials, correct?</p> <p>2 A Probably.</p> <p>3 Q Right. It -- it was not written for and</p> <p>4 is inappropriate for analyzing other mineral</p> <p>5 products, correct?</p> <p>6 A No.</p> <p>7 MR. FROST: Objection to form.</p> <p>8 BY MR. PLACITELLA:</p> <p>9 Q No what?</p> <p>10 A I don't think it's inappropriate.</p> <p>11 Q Do you believe it's appropriate to use</p> <p>12 PLM for analysis beyond bulk insulation materials?</p> <p>13 A Yes.</p> <p>14 (Wylie Exhibit No. AW-17 was</p> <p>15 marked for identification.)</p> <p>16 BY MR. PLACITELLA:</p> <p>17 Q I just handed you AW-17. If we can go</p> <p>18 to the -- okay.</p> <p>19 This is a letter written by you to the</p> <p>20 University of Maryland. Do you see that?</p> <p>21 MR. FROST: Objection to form.</p> <p>22 BY MR. PLACITELLA:</p> <p>23 Q On the University of Maryland letterhead</p> <p>24 to the Massachusetts Department of Health written</p> <p>25 by you, correct?</p>
<p style="text-align: right;">Page 163</p> <p>1 A No, it's not restricted to that.</p> <p>2 Q Okay. So you looked at the TEM</p> <p>3 component as well?</p> <p>4 A I did.</p> <p>5 Q Okay. Now -- sorry. Give me a second.</p> <p>6 The PLM method, is that the same method</p> <p>7 that was recommended by -- that was used by the</p> <p>8 EPA?</p> <p>9 A I'm sorry. The PLM method, which one</p> <p>10 are we speaking about?</p> <p>11 Q All right. Is there more than one PLM</p> <p>12 method for testing for asbestos in materials?</p> <p>13 A By polarized light microscopy?</p> <p>14 Q Mm-hmm.</p> <p>15 A Okay. The PLM method that is actually</p> <p>16 written as a method, the -- by polarized light,</p> <p>17 the EPA is certainly the most recent -- the most</p> <p>18 recent.</p> <p>19 Q Okay. And that's what most laboratories</p> <p>20 rely upon?</p> <p>21 A I don't -- I can't answer that question.</p> <p>22 Q Okay. That's for -- that was written</p> <p>23 for the analysis of bulk materials, correct?</p> <p>24 A That's correct.</p> <p>25 Q It was actually written for the analysis</p>	<p style="text-align: right;">Page 165</p> <p>1 A Yes, um-hmm.</p> <p>2 Q Okay. And it was written in 1986?</p> <p>3 A Yes.</p> <p>4 Q Correct?</p> <p>5 A Yes.</p> <p>6 Q And can you go to the last paragraph.</p> <p>7 A At the end of the document?</p> <p>8 Q Yes, ma'am -- yes, Doctor.</p> <p>9 A Yes.</p> <p>10 Q You write in this paragraph: "I would</p> <p>11 like to make one final point. The PLM method</p> <p>12 recommended by EPA and published by them, which</p> <p>13 most laboratories are relying upon -- relying on</p> <p>14 for the analysis of play sand, was written for</p> <p>15 analysis of bulk insulation materials found in</p> <p>16 buildings. It is inappropriate for the analysis</p> <p>17 of sand, crushed stone, or other mineral</p> <p>18 products."</p> <p>19 Do you see that?</p> <p>20 A Yes.</p> <p>21 Q It says: "The reasons are many.</p> <p>22 Fundamental to this discussion, however, is the</p> <p>23 fact that if amphiboles are found in insulation,</p> <p>24 they are most likely to be asbestos. Asbestos</p> <p>25 fibers have many unique properties which made them</p>

<p style="text-align: right;">Page 166</p> <p>1 ideal for insulation. Cleavage fragments lack 2 these properties. However, when amphiboles are 3 found in crushed rock, they are not likely to be 4 asbestos, and criteria to discriminate between 5 asbestos and non-asbestos must be applied, 6 discriminators that are not usually necessarily -- 7 necessary when dealing with insulation and which 8 are not included in the EPA's interim method." 9 Did I read that correctly? 10 A That's correct. 11 Q Okay. Now, in preparing for today's 12 deposition, how much time did you spend? 13 A Close to a hundred hours. 14 Q And how did you spend that hundred 15 hours? 16 A Researching and writing the report. And 17 reviewing -- 18 Q I asked about preparing for the 19 deposition. 20 A Oh, I'm sorry. I'm sorry. I 21 misunderstood. 22 Q Sure. 23 A Yesterday and the day before. 24 Q Okay. And did -- did you do that with 25 someone?</p>	<p style="text-align: right;">Page 168</p> <p>1 Q Yeah. 2 A No. 3 Q You weren't? Were you part of the IARC 4 Working Group around 2010? 5 A 2006. 6 Q 2006. 7 A Yes. 8 Q And at any point in time when you were 9 working in the working group, were you required to 10 disclose your prior or current work for industry 11 at the time? 12 A I can't recollect. 13 Q Do you know whether you ever disclosed 14 to the IARC your work with industry? 15 MR. FROST: Objection to form. 16 THE WITNESS: I -- I don't recollect. I 17 think they required -- I'm trying to go back. 18 They must have asked for something. I can't 19 remember truthfully. I believe -- yes, let me go 20 back. I think it talked about within the last 21 three years or two years or something like that. 22 They did have some kind of statement about that, 23 which I would -- would have filled out. 24 (Wylie Exhibit AW-16 was marked 25 for identification.)</p>
<p style="text-align: right;">Page 167</p> <p>1 A With Mr. Frost and Mr. Ewald. 2 Q Okay. And -- 3 A I think one more person. 4 Q And then before that, you spent about a 5 hundred hours on your report? 6 A Approximately. 7 MR. FROST: Objection to form. 8 BY MR. PLACITELLA: 9 Q And what was your compensation per hour? 10 A \$350 per hour. 11 Q Times a hundred hours? 12 A That's correct. 13 Q Is that what you billed them for? 14 A I haven't billed them, but that -- I 15 will bill them at that rate. 16 Q Okay. And did you do any research as it 17 relates to the supply of talc from China? 18 A No. 19 Q Okay. 20 A Let me -- let me qualify. I have not 21 been able to find in the literature much on China, 22 so... 23 Q Okay. When -- you were part of the 24 IARC '93 Working Group. Is that fair? 25 A '93?</p>	<p style="text-align: right;">Page 169</p> <p>1 BY MR. PLACITELLA: 2 Q Okay. Now -- give me a second. 3 There you go. I put up on the -- or I'm 4 putting up on the screen a letter written to you 5 in 1987 by Johnson & Johnson. That's you, Ann -- 6 Ann W. Wylie, Professor, correct? 7 A Yes. 8 Q Okay. And it is written by a 9 Mr. Ashton. Do you see that? 10 A Yes, I do. 11 Q Okay. And it actually copies the 12 medical director for Johnson & Johnson. You don't 13 know that? 14 A No. 15 Q Okay. And it -- I asked you before 16 whether you had done any work on -- with ASTM 17 for -- prior to three years ago, and you told me 18 no, and you told me you knew nothing about any 19 work with Ashton or Johnson & Johnson. 20 Do you recall that? 21 A I do. 22 Q Okay. Now, here Ashton writes to you 23 and talks about the work you were doing on the 24 ASTM committee concerning polarized light 25 microscopy, correct?</p>

<p style="text-align: right;">Page 170</p> <p>1 MR. FROST: Objection to form, misstates 2 the document. 3 THE WITNESS: I was not a member of ASTM 4 D22. 5 BY MR. PLACITELLA: 6 Q But you were working with ASTM and you 7 were working with Johnson & Johnson, according to 8 this, correct? 9 MR. FROST: Objection to form, misstates 10 the document. 11 THE WITNESS: I had -- I have no 12 recollection that I got this letter from Johnson & 13 Johnson when I replied that I had never worked for 14 them. I just have no recollection. 15 BY MR. PLACITELLA: 16 Q Well, this is about -- 17 A And I wasn't working for them. 18 Q But you were working in conjunction with 19 ASTM in 1987 and interacting with Johnson & 20 Johnson, correct? 21 MR. FROST: Objection to form. 22 THE WITNESS: I wasn't a member of ASTM. 23 ASTM asked me to develop a polarized light 24 microscopy method for asbestos, and I did work on 25 that. And I -- I would have said so, but the form</p>	<p style="text-align: right;">Page 172</p> <p>1 THE WITNESS: I did not work with 2 Johnson & Johnson. This Mr. Ashton may have been 3 a member of D22. I don't know. And perhaps he 4 read the draft document and wrote me this letter. 5 I have no recollection of knowing Mr. Ashton, and 6 I never worked with Johnson & Johnson. 7 BY MR. PLACITELLA: 8 Q Well -- let's just go through it. 9 A Sure. 10 Q He states in this letter to you: "At a 11 previous meeting, Mike Beard of Triangle Park 12 EPA" -- do you know who he is? 13 A I do. 14 Q -- "appointed Slim Thompson and me to be 15 talc industry specialists on the PLM for ASTM 16 committee." 17 Do you see -- see that? 18 A I do. 19 Q And you know who Slim Thompson is, 20 right? 21 A I do. 22 Q He worked for who, R.T. Vanderbilt? 23 A That's correct. 24 Q And did you work with Slim Thompson from 25 R.T. Vanderbilt on the ASTM specifications?</p>
<p style="text-align: right;">Page 171</p> <p>1 of your question earlier didn't -- it didn't 2 suggest to me that you were interested in this, 3 because I wasn't a member of ASTM. 4 So ASTM wanted a method. They asked if 5 I would develop one, and I tried. It was never 6 published. It never made it out of what they 7 called then the gray sheets, and so it was -- it 8 never led to anything in particular. 9 BY MR. PLACITELLA: 10 Q Well, when did you first start working 11 with the ASTM, even if you weren't a member? 12 A Oh, I -- 13 MR. FROST: Objection to form. 14 THE WITNESS: I only did this, whenever 15 this was, '87. Probably I worked on that document 16 maybe for a year, six months or a year. 17 BY MR. PLACITELLA: 18 Q Okay. 19 A As I said, it never went anywhere. 20 So... 21 Q And so you did work with Johnson & 22 Johnson on -- in conjunction with the -- with the 23 ASTM in terms of standards for testing for 24 asbestos, right? 25 MR. FROST: Objection to form.</p>	<p style="text-align: right;">Page 173</p> <p>1 MR. FROST: Objection to form. 2 THE WITNESS: He was, as this letter 3 states, their representative. So perhaps he made 4 comments to me about the method. 5 BY MR. PLACITELLA: 6 Q So you did work with him? 7 MR. FROST: Objection to form. 8 Misstates testimony. 9 THE WITNESS: "Work with him." I mean, 10 you know, if you -- if you want to say that when I 11 was developing this method, I worked with the ASTM 12 D22 committee, then I would say that would be 13 correct. They asked me to develop it. And as you 14 can see, the ASTM committee is preparing my 15 method. Not me. They were preparing my method. 16 BY MR. PLACITELLA: 17 Q Yeah, so all I'm saying is, so you 18 worked with members of the talc industry through 19 the ASTM committee on a method for testing 20 asbestos in talc, correct? 21 MR. FROST: Objection to form, misstates 22 testimony. 23 THE WITNESS: They -- there -- there 24 were -- obviously from -- Slim Thompson was from 25 the talc industry, and this Mr. Ashton appears to</p>

<p style="text-align: right;">Page 174</p> <p>1 have been. And there were -- ASTM D22 is a very 2 large committee. So there were -- may have been 3 other members from the talc industry or other 4 industries on this committee. 5 BY MR. PLACITELLA: 6 Q Okay. And -- 7 A So I worked with that committee. So if 8 that is responsive to your answer, I worked with 9 that committee. 10 Q Okay. And members of that committee, 11 including Mr. Ashton and Mr. Thompson, made 12 suggestions to you concerning what definitions you 13 should use in your methods. Correct? 14 A This -- 15 MR. FROST: Objection to form. 16 THE WITNESS: This letter states that 17 they would -- wanted me to use definitions that 18 conformed to previous ASTM standards. 19 BY MR. PLACITELLA: 20 Q Right. And did you do that? 21 A I don't remember. The -- it may be 22 that's the reason that this method never was 23 approved by ASTM. I don't know. 24 Q So when did your involvement stop with 25 the ASTM committee that was responsible for coming</p>	<p style="text-align: right;">Page 176</p> <p>1 Nytal 99. Do you see that? 2 A Yes. 3 Q And that was done for the same 4 Mr. Thompson, Slim Thompson? 5 MR. FROST: Objection to form. 6 BY MR. PLACITELLA: 7 Q Correct? 8 A He sent me the samples. 9 Q Right. 10 A Yes. 11 Q And I'm just focus -- I'm just looking 12 at methodology. I'm looking at your middle 13 paragraph of this report. 14 You say: "Asbestos fiber populations 15 are composed of either chrysotile or a member of 16 the amphibole family that occur as a -- as 17 particulates that display some or all of the 18 following characteristics." 19 And you say: "Fiber bundles with 20 splayed ends, curved fibers, aspect ratios in 21 excess of 20-to-1, and widths less than 1 22 micrometer for fibers longer than 5 micrometers, 23 and matted masses of individual fibers." 24 Do you see that? 25 A Yes.</p>
<p style="text-align: right;">Page 175</p> <p>1 up with standards for testing for asbestos? 2 A The method that -- that I drafted went 3 into the ASTM bureaucracy, and it came back to me 4 maybe once or twice. I -- my memory is a 5 little -- and then I never heard from them again. 6 Q And until the last three or four years? 7 A Well, I joined ASTM D22 about three 8 years ago. 9 Q Okay. And did you come up with a method 10 that was adopted by D22 within the last three 11 years? 12 A No. 13 Q Now -- oh, sorry. Give me a second. 14 (Counsel conferring.) 15 MR. PLACITELLA: So somebody was -- did 16 she come back with a copy yet? 17 (Wylie Exhibit AW-40 was marked 18 for identification.) 19 BY MR. PLACITELLA: 20 Q I'm only going to focus on a paragraph. 21 I have up here a one-page report that you did for 22 -- in 1985 for R.T. Vanderbilt. And I have it 23 identified as AW-40. 24 A Yes. 25 Q And it was a report that you did on</p>	<p style="text-align: right;">Page 177</p> <p>1 Q Now, in this methodology you indicate 2 the width can't be less than 1 micrometer, 3 correct? 4 MR. FROST: Objection to form. 5 THE WITNESS: That the widths can be 6 less than 1 micro- -- is that what you said? 7 BY MR. PLACITELLA: 8 Q It says "widths less than." In other 9 words, that's what you're requiring, widths less 10 than 1 micrometer -- 11 A Yes. 12 Q -- for fibers longer than 5 micrometer. 13 A That's what it says. 14 Q That's different than what's in AW-50, 15 correct? 16 MR. FROST: Objection to form, misstates 17 the document. 18 MR. PLACITELLA: Please don't do that. 19 Please don't do that. 20 THE WITNESS: Yes. 21 BY MR. PLACITELLA: 22 Q Okay. Why is it different? 23 A Well, they -- 1 micrometer was -- after 24 a lot of study, this was in '86, I felt was not 25 appropriate for fiber bundles, the fibrils in the</p>

<p style="text-align: right;">Page 178</p> <p>1 bundles. And so -- and then this actually says 2 that the fiber bundles have widths less than 3 1 micrometer. That's what it says. 4 Q Right. Well, this is different. Why is 5 it different? 6 A Well, fiber bundles -- this says fiber 7 bundles. This -- this -- what's written here and 8 what's written there are not the same thing. You 9 asked me what were the properties of the 10 materials, the fibrils that formed the fiber 11 bundles. This just says bundles with splayed 12 ends, curved fibers and -- you know, any particle 13 with widths less than 1 micrometer. 14 So we're really talking about the 15 population as a whole, and in that conversation 16 you and I were having earlier, we were talking 17 about the size of particles in fiber bundles. 18 And over time, I stopped using 19 1 micrometer because I thought that it was 20 confusing. There's no asbestos that I know that 21 curves in fiber bundles where the fibrils are 22 1 micrometer. 23 Q When did you stop using that? 24 A I don't know. 25 And what year was this? In 1985?</p>	<p style="text-align: right;">Page 180</p> <p>1 A Yes. 2 Q -- that's in AW-50, is that -- does that 3 appear in any peer-reviewed geologic literature 4 other than literature authored by yourself? 5 A We discussed this earlier, I think, and 6 I said that there may be -- it may be in the 7 Bureau of Mines literature. I would have to do a 8 literature search to find that out. I actually 9 don't know. It may be in the Bureau of Mines 10 literature. 11 Q Actually, I was asking you different 12 questions. 13 A Oh. 14 Q So -- but that's okay. So now I'm 15 asking you the methodology -- 16 A Yes. 17 Q -- that you're using here in this case 18 as reflected in AW-50, as you sit here, can you 19 point to any peer-reviewed geologic literature 20 that adopts verbatim your methodology? 21 MR. FROST: Objection to form. 22 THE WITNESS: As I said, I -- I'd have 23 to review the literature before I could answer 24 that. 25 BY MR. PLACITELLA:</p>
<p style="text-align: right;">Page 179</p> <p>1 Q Correct. 2 A I -- I'm sorry, I don't remember. But 3 it wasn't probably much longer after that, as the 4 work I was doing was progressing and I had looked 5 at more samples and things like that. 6 Q Okay. 7 A Fibrils of asbestos have to be less than 8 1 micrometer, which is what our earlier 9 conversation directed at. 10 Q This AW-50 -- 11 A Yes. 12 Q -- what's in here, is this, as you've 13 articulated here, adopted in any peer-reviewed 14 geologic literature other than that authored by 15 yourself? 16 MR. FROST: Objection to form. 17 THE WITNESS: It's close to the EPA 18 document -- 19 BY MR. PLACITELLA: 20 Q Oh, but -- 21 A -- published in '93. 22 Q What I'm asking you is the criteria that 23 forms the basis -- 24 A Yes. 25 Q -- of your opinion here --</p>	<p style="text-align: right;">Page 181</p> <p>1 Q Okay. 2 A It's not really fair to ask me -- 3 Q All right. 4 A -- about the whole world of literature 5 when -- on a topic I have not had a chance to 6 refresh myself on. 7 Q I know, but this -- 8 A And I think we've gotten to the point 9 where I told you before that I am not aware at 10 this moment in time other than the EPA or the 11 Bureau of Mines directly. 12 Q Okay. Let's just break it down, because 13 I'm a little slow on the uptake. 14 Putting aside the Bureau of Mines and 15 the EPA, which you're not sure of, correct? 16 A I'm sure of the EPA. 17 Q You're sure that the EPA adopts 18 identically what's in AW-50? 19 A I'm sorry, but, you know, you're asking 20 me to verbatim say something about a word-for-word 21 definition, and I'm a writer, and I don't ever -- 22 I would never do this. I'd like to have a chance, 23 as we have discussed, to correct what's written in 24 there to make sure -- 25 Q Okay. So --</p>

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1 A I am not going to say what you've
 2 written down there is appropriate.
 3 For example, I think you wrote
 4 "20-to-1," and I said "mean aspect ratio."
 5 Q Well, you'll fix -- okay. We will stop.
 6 A Yes.
 7 Q Okay. We'll come back to it.
 8 MR. PLACITELLA: Let me just go to a
 9 different -- she's not back yet with the stuff?
 10 Okay. Hold on.
 11 (Counsel conferring.)
 12 BY MR. PLACITELLA:
 13 Q Just before I move to a different topic,
 14 can we agree that asbestos in talc is not an
 15 analysis of bulk material?
 16 MR. FROST: Objection to form.
 17 BY MR. PLACITELLA:
 18 Q When you're looking for asbestos in
 19 talc, it's not an analysis of bulk material.
 20 MR. FROST: Same objection.
 21 THE WITNESS: I'm sorry. What do you
 22 think it's an analysis of?
 23 BY MR. PLACITELLA:
 24 Q Well, when you're -- how do you know --
 25 I mean it's a mixture, right? It's not a bulk

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1 material of one substance. Can we agree with
 2 that?
 3 MR. FROST: Objection to form.
 4 THE WITNESS: I'm sorry, I'm still not
 5 understanding. Talc when -- you analyze talc by
 6 polarized light microscopy, it's a bulk method.
 7 BY MR. PLACITELLA:
 8 Q Okay. That's it.
 9 A That's the question you asked, I
 10 believe.
 11 Q That's it. That's the only method it
 12 is.
 13 MR. FROST: Objection to form.
 14 BY MR. PLACITELLA:
 15 Q It's just a bulk method for nothing
 16 else.
 17 A Polarized light microscopy is used for
 18 analysis of bulk samples. It's in that regard --
 19 I mean, it's not useful for the analysis of air
 20 samples.
 21 Q Okay. And when getting to the aspect
 22 ratio --
 23 A Yes.
 24 Q -- of 20-to-1, using polarized light
 25 microscopy --

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1 A Yes.
 2 Q -- where is that published in the
 3 medical literature -- I'm sorry, in the geologic
 4 literature, other than your own publications?
 5 A I -- you've asked me this question, and
 6 I would have to search the literature to find out
 7 if it were -- were adopted elsewhere. I actually
 8 don't know.
 9 Q Mm-hmm.
 10 A And remember it's not aspect ratio
 11 20-to-1, it's mean aspect ratio.
 12 Q Mm-hmm. Is asbestos in bulk when it's
 13 found in talc?
 14 MR. FROST: Objection to form.
 15 THE WITNESS: I -- I'm sorry, but that
 16 question doesn't actually make any sense. I'm not
 17 understanding.
 18 If we're looking at a sample under
 19 polarized light microscopy, that's a bulk sample.
 20 BY MR. PLACITELLA:
 21 Q Mm-hmm.
 22 A It's a sample that is something you can
 23 hold in your hand. It's a bulk sample. It's not
 24 an air sample. So the term "bulk sample" means
 25 any sample that's not an air sample.

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1 Q Okay.
 2 A Okay? Or water sample.
 3 Q Okay.
 4 A Okay.
 5 Q So this is what I guess I'm trying to
 6 understand.
 7 A Yes.
 8 Q Based upon everything that we went
 9 through in -- and with -- with your right to
 10 revise it, okay?
 11 A Mm-hmm.
 12 Q -- in AW-50, if I'm a scientist --
 13 A Mm-hmm.
 14 Q -- a geologist --
 15 A Mm-hmm.
 16 Q -- and I'm not -- I'm not Ann Wylie, how
 17 do I duplicate what you do using this criteria?
 18 How do I look at the same sample that you do, and
 19 use your methodology and come up with a
 20 conclusion?
 21 MR. FROST: Objection to form.
 22 BY MR. PLACITELLA:
 23 Q And come to the same conclusion.
 24 A Well, number one, you need to be trained
 25 in polarized light microscopy. I don't think you

<p style="text-align: right;">Page 186</p> <p>1 could do it.</p> <p>2 Q Not me. That's -- let me -- let me</p> <p>3 rephrase the question.</p> <p>4 A Okay.</p> <p>5 Q I'm somebody who understands and has</p> <p>6 been trained in polarized light microscopy.</p> <p>7 A Okay.</p> <p>8 Q I'm a geologist such as yourself.</p> <p>9 A Okay.</p> <p>10 Q Okay. And I'm looking at the same</p> <p>11 sample that you are.</p> <p>12 A Mm-hmm.</p> <p>13 Q Okay. Using your criteria --</p> <p>14 A Mm-hmm.</p> <p>15 Q -- how do I come to the same conclusions</p> <p>16 that you do?</p> <p>17 MR. FROST: Objection to form.</p> <p>18 BY MR. PLACITELLA:</p> <p>19 Q What -- what do -- how do I do that?</p> <p>20 A You apply the criterias, the method the</p> <p>21 EPA uses. You apply the criteria.</p> <p>22 Q But it seems from the way you are</p> <p>23 articulating it, with respect, that there is some</p> <p>24 subjectivity in applying that criteria. That you</p> <p>25 look at and you say, This is what I think I see.</p>	<p style="text-align: right;">Page 188</p> <p>1 MR. FROST: Objection to form.</p> <p>2 BY MR. PLACITELLA:</p> <p>3 Q Is that what you are saying?</p> <p>4 A I'm sorry, I can't speak for another</p> <p>5 person. I believe the methods that EPA uses is a</p> <p>6 recognized method among microscopists for the</p> <p>7 analysis of bulk samples for asbestos, and I don't</p> <p>8 think -- I think that the results should be</p> <p>9 comparable if we look at the same slide.</p> <p>10 Q Okay. So -- all right.</p> <p>11 (Wylie Exhibit No. AW-31 was</p> <p>12 marked for identification.)</p> <p>13 BY MR. PLACITELLA:</p> <p>14 Q Let me go to AW-31.</p> <p>15 I'm sorry, I should get a smaller table.</p> <p>16 AW-31 is a paper that was written by you</p> <p>17 and others?</p> <p>18 A With coauthors, yes.</p> <p>19 Q Okay. And including somebody --</p> <p>20 including RJ Lee.</p> <p>21 A He's one of the authors.</p> <p>22 Q Okay. And in your paper at page 241,</p> <p>23 you state that: "Asbestos fibers wider than</p> <p>24 1 micron are composed of bundles of fibrils that</p> <p>25 readily split longitudinally into individual</p>
<p style="text-align: right;">Page 187</p> <p>1 And other people could apply the exact same</p> <p>2 criteria, have the same exact skills as you, and</p> <p>3 possibly come to a different conclusion. Is that</p> <p>4 possible?</p> <p>5 MR. FROST: Objection to form.</p> <p>6 THE WITNESS: No. I'm sorry, but that's</p> <p>7 not an answerable question.</p> <p>8 BY MR. PLACITELLA:</p> <p>9 Q So if I -- if I am a trained -- if I'm</p> <p>10 trained in polarized light microscopy, like you</p> <p>11 are, and I look at the same sample, and I apply</p> <p>12 your criteria, I will have no -- no -- it's</p> <p>13 inevitable I will reach the same exact conclusion</p> <p>14 that you do.</p> <p>15 A The EPA method has been tested and used</p> <p>16 by many places, and I don't think that it is in</p> <p>17 question.</p> <p>18 Q So --</p> <p>19 A I believe you would find the same</p> <p>20 results.</p> <p>21 Q So from your perspective, somebody with</p> <p>22 the same training as you, looking at the same</p> <p>23 example using your methodology, there is no way</p> <p>24 they could come to a different conclusion than you</p> <p>25 do.</p>	<p style="text-align: right;">Page 189</p> <p>1 fibers of much smaller width. Even if wider</p> <p>2 fibers were inhaled, because of the fibular</p> <p>3 structure of asbestos, the fibers desegregate."</p> <p>4 Are you with me?</p> <p>5 A I -- I'm not sure where you're reading.</p> <p>6 There's a lot on page 241.</p> <p>7 Q That's why I highlighted.</p> <p>8 A Sorry. I didn't look at the screen.</p> <p>9 Let me just look. (Peruses document.)</p> <p>10 Yes.</p> <p>11 Q Okay. And you further state: "Cook and</p> <p>12 co-workers demonstrated that -- the effectiveness</p> <p>13 of this process in their animal intratracheal</p> <p>14 installation experiments with ferro-actinolite</p> <p>15 asbestos. In these experiments they showed that</p> <p>16 the number of fibers found in lung tissue</p> <p>17 increased following cessation of exposure, and</p> <p>18 that the increase was due to longitudinal</p> <p>19 splitting of the asbestos fiber bundles."</p> <p>20 Do you agree with that?</p> <p>21 A It says "the splitting of fiber</p> <p>22 bundles," but, yes --</p> <p>23 Q Okay.</p> <p>24 A -- that's what it says.</p> <p>25 Q Now, I want to talk to you a little bit</p>

<p style="text-align: right;">Page 190</p> <p>1 about -- by the way, does any federal agency 2 recognize fibrous talc as asbestos? 3 MR. FROST: Objection to form. 4 THE WITNESS: In regulatory policy? In 5 regulatory policy? 6 BY MR. PLACITELLA: 7 Q Yes. 8 A Not that I'm aware of. 9 Q Okay. I meant to ask you one final 10 question before I move on. 11 Is cosmetic talc a bulk material from 12 your perspective? 13 MR. FROST: Objection to form. 14 THE WITNESS: Yes. 15 BY MR. PLACITELLA: 16 Q Okay. Is cosmetic talc a building 17 material? Bulk building material. 18 A I -- I don't know. I mean, I don't know 19 whether it was used that way, but it's not. 20 Q Okay. Okay. Now, do -- are you 21 familiar with a -- a testing method known as x-ray 22 defraction? 23 A Yes. 24 Q Okay. And are you familiar with what 25 the limits of detection are with x-ray defraction?</p>	<p style="text-align: right;">Page 192</p> <p>1 have different detection limits by x-ray 2 defraction. 3 Now, maybe we are splitting hairs here, 4 and it's the difference between 0.1 and 0.2 or 0.2 5 and 0.3, or something like that, percent. But it 6 does vary depending upon the nature of the 7 amphibole itself. 8 Q Okay. So let me try to be a little bit 9 more specific. 10 A Okay. 11 Q Looking at a sample, talc sample -- 12 A Yes. 13 Q -- that comes out of a Vermont talc 14 mine -- 15 A Yes. 16 Q -- and I'm looking to determine whether 17 that sample contains amphiboles -- 18 A Yes. 19 Q -- before we even get to whether it's 20 asbestos. 21 A Yes. 22 Q Just the mineral -- a mineral amphibole. 23 A Yes. 24 Q Okay? 25 A Yes.</p>
<p style="text-align: right;">Page 191</p> <p>1 A I am. 2 Q Okay. Can you tell me is -- is x-ray 3 defraction -- well, what's the limit of detection 4 for x-ray defraction for amphiboles, if you know? 5 A I can't answer that question without 6 talking about the matrix. 7 Q Okay. 8 A So in some -- in some materials it might 9 be 5 percent. 10 Q Okay. 11 A In some materials it could be 0.1. 12 Q Okay. So when you -- if you're using 13 x-ray defraction and looking at talc that comes 14 out of a mine -- 15 A Yes. 16 Q -- what's the limit of detection for 17 that purpose? 18 A Okay. Let me say also, going backward, 19 that the detection limit depends upon the matrix, 20 and it also depends upon the actual material 21 that's forming the -- the amphibole. 22 X-ray defraction cannot identify 23 asbestos. X-ray defraction can only identify a 24 mineral. Okay? So if -- in some minerals, the 25 same mineral from different places may actually</p>	<p style="text-align: right;">Page 193</p> <p>1 Q For example, tremolite. 2 A Yes. 3 Q Okay. What's the limit of detection? 4 A I don't think I know for the Vermont. I 5 would say it was some place between 0.2 and 0.5 6 percent. 7 Q 0.1 and 0.5 percent? 8 A Something like that, yes. 9 Q So if you used x-ray defraction as a 10 screening tool -- 11 A Yes. 12 Q Okay. For that talc coming out of that 13 mine, would you agree with me that it will not 14 detect low levels of tremolite, putting aside 15 whether they're asbestiform or not? 16 A You must -- 17 MR. FROST: Object -- 18 THE WITNESS: -- define "low." 19 MR. FROST: Hold on. Objection to form. 20 THE REPORTER: Can you repeat that, 21 please? 22 THE WITNESS: Please define "low." 23 BY MR. PLACITELLA: 24 Q Okay. It cannot -- you can't use x-ray 25 defraction to find tremolite in talc at levels</p>

<p style="text-align: right;">Page 194</p> <p>1 below 0.1 percent.</p> <p>2 MR. FROST: Objection to form.</p> <p>3 THE WITNESS: I would say that is</p> <p>4 probably true.</p> <p>5 BY MR. PLACITELLA:</p> <p>6 Q Okay. Now, is there -- you get the same</p> <p>7 talc out of a mine in Vermont, using x-ray</p> <p>8 defraction, can you find chrysotile asbestos using</p> <p>9 that method, x-ray defraction?</p> <p>10 MR. FROST: Objection to form.</p> <p>11 THE WITNESS: Yes.</p> <p>12 BY MR. PLACITELLA:</p> <p>13 Q Okay. And at what level? What's the</p> <p>14 detection level?</p> <p>15 MR. FROST: Object -- objection.</p> <p>16 THE WITNESS: I've not seen data on</p> <p>17 that.</p> <p>18 BY MR. PLACITELLA:</p> <p>19 Q Okay.</p> <p>20 A But I would guess it was of the same</p> <p>21 general -- but I -- I -- I haven't seen the data,</p> <p>22 and there may be overlap in the peaks with</p> <p>23 chrysotile. I'm more familiar with amphibole.</p> <p>24 So --</p> <p>25 Q Okay. So --</p>	<p style="text-align: right;">Page 196</p> <p>1 document we don't even know what it is, frankly.</p> <p>2 BY MR. PLACITELLA:</p> <p>3 Q Okay. Do you agree with that statement?</p> <p>4 MR. FROST: Same objection.</p> <p>5 THE WITNESS: I -- are we talking about</p> <p>6 the entire -- the entire paragraph? Can I -- are</p> <p>7 we talking about just one sentence?</p> <p>8 BY MR. PLACITELLA:</p> <p>9 Q I'm going to ask you about -- are you</p> <p>10 more comfortable looking at the whole paragraph?</p> <p>11 A I don't care. I just want to know what</p> <p>12 you're asking me.</p> <p>13 Q No, I was just asking you about that one</p> <p>14 sentence.</p> <p>15 A I would say that that was probably</p> <p>16 correct.</p> <p>17 Q Okay. It says: "It occurs in</p> <p>18 asbestiform and non-asbestiform varieties."</p> <p>19 You agree with that, correct?</p> <p>20 A Yes.</p> <p>21 MR. FROST: Same objections.</p> <p>22 BY MR. PLACITELLA:</p> <p>23 Q Okay. And then it talks about a sample.</p> <p>24 It says: "This sample is a chunky tremolite, not</p> <p>25 the asbestiform variety."</p>
<p style="text-align: right;">Page 195</p> <p>1 A I'd have -- I'd have to look at the</p> <p>2 defraction pattern again.</p> <p>3 Q So you don't feel comfortable talking</p> <p>4 about that?</p> <p>5 A I don't actually.</p> <p>6 Q Okay. All right. Be with you in one</p> <p>7 second.</p> <p>8 I -- I put up in here a statement that</p> <p>9 says: "Tremolite is the commonest asbestos</p> <p>10 mineral found as a contaminate of talc."</p> <p>11 Do you agree with that?</p> <p>12 MR. FROST: Hold on. I'm going to</p> <p>13 object. We have no idea what this document is.</p> <p>14 MR. PLACITELLA: I'm just asking if she</p> <p>15 agrees with the statement, and then we'll talk</p> <p>16 about the document.</p> <p>17 MR. FROST: Objection to form.</p> <p>18 MR. LOCKE: You're asking about this --</p> <p>19 you're asking her to comment on this sample?</p> <p>20 MR. PLACITELLA: No. I'm asking her</p> <p>21 whether she agrees with the statement: Tremolite</p> <p>22 is the commonest asbestos mineral found as a</p> <p>23 contaminate of talc. That's what I'm asking.</p> <p>24 MR. FROST: Same objection to form. I</p> <p>25 think this is inappropriate to ask her about a</p>	<p style="text-align: right;">Page 197</p> <p>1 And then it states: "But when it is</p> <p>2 ground, it produces some thin, straight particles</p> <p>3 which conform to the definition of 'fibers' in the</p> <p>4 method and which are distinguishable from those</p> <p>5 produced by asbestiform tremolite on grinding."</p> <p>6 Do you agree with that?</p> <p>7 A No.</p> <p>8 MR. FROST: And objection to form.</p> <p>9 Again, we're talking about methods and things like</p> <p>10 that, and you're not allowing her to get any</p> <p>11 context from the statement which you're having her</p> <p>12 read.</p> <p>13 MR. PLACITELLA: All I'm asking her is</p> <p>14 if she agrees with that statement.</p> <p>15 THE WITNESS: I can't agree when it says</p> <p>16 "the method," and I have no idea what you're</p> <p>17 talking about.</p> <p>18 BY MR. PLACITELLA:</p> <p>19 Q Okay. Do you agree that when</p> <p>20 non-asbestiform tremolite is ground, it produces</p> <p>21 some thin, straight particles which conform to the</p> <p>22 definition of 'fibers' in the method and which are</p> <p>23 indistinguishable from those produced by</p> <p>24 asbestiform tremolite on grinding?</p> <p>25 MR. FROST: Same objections.</p>

<p style="text-align: right;">Page 198</p> <p>1 It's getting absurd, Chris.</p> <p>2 THE WITNESS: I have no idea what the</p> <p>3 method you're talking about is. I can't possibly</p> <p>4 agree to that statement. I don't know what the</p> <p>5 method is.</p> <p>6 BY MR. PLACITELLA:</p> <p>7 Q Okay. Well, I'll give you -- so here we</p> <p>8 have a letter from the FDA to Johnson & Johnson,</p> <p>9 and it -- let's go through it. And I'll --</p> <p>10 MR. FROST: Again, objection to the</p> <p>11 characterization of the document, but --</p> <p>12 MR. PLACITELLA: Well, it's from the FDA</p> <p>13 to Johnson & Johnson, dated May 14th, 1974. Is</p> <p>14 there any dispute about that?</p> <p>15 MR. FROST: It doesn't appear to be a</p> <p>16 letter. It's on a letterhead that says</p> <p>17 "Memorandum."</p> <p>18 MR. PLACITELLA: Oh, okay.</p> <p>19 BY MR. PLACITELLA:</p> <p>20 Q It says: "The purpose of this study is</p> <p>21 to check the adequacy of microscopic method for</p> <p>22 detecting the presence of asbestos minerals in</p> <p>23 talc and for counting fibers of these minerals.</p> <p>24 Three reference samples and four samples for</p> <p>25 analysis are being sent under separate cover."</p>	<p style="text-align: right;">Page 200</p> <p>1 co-defendants in the case as well?</p> <p>2 A Only Johnson & Johnson.</p> <p>3 (Wylie Exhibit No. AW-35 was</p> <p>4 marked for identification.)</p> <p>5 BY MR. PLACITELLA:</p> <p>6 Q Okay. I want to show you -- AW-35 is a</p> <p>7 document entitled "Talc Asbestos Education</p> <p>8 Document."</p> <p>9 Have you ever seen this before?</p> <p>10 A No.</p> <p>11 Q Okay. I'm going to show you to page 8</p> <p>12 of the document. Do you know who Julie Pier is,</p> <p>13 by the way?</p> <p>14 A I do.</p> <p>15 Q And is she a respected scientist? Does</p> <p>16 she know what she is talking about when it comes</p> <p>17 to microscopy?</p> <p>18 A I really -- I think so, but I don't</p> <p>19 know. I have not read her work.</p> <p>20 Q Okay. In this document, the author</p> <p>21 writes: "The asbestiform morphological criteria,</p> <p>22 as defined by Wylie, may not apply to fibers that</p> <p>23 have been aggressively milled and area of size</p> <p>24 range below the resolution of the light</p> <p>25 microscope. See following quote by Wylie. I do</p>
<p style="text-align: right;">Page 199</p> <p>1 Do you see that?</p> <p>2 A Yes.</p> <p>3 Q Okay. And then it talks about reference</p> <p>4 samples. See that?</p> <p>5 MR. FROST: Objection to form.</p> <p>6 THE WITNESS: I see that -- I -- I have</p> <p>7 read that part, yes.</p> <p>8 BY MR. PLACITELLA:</p> <p>9 Q So -- now, just going back and this is</p> <p>10 what I'm trying to understand in context.</p> <p>11 Do you agree that if you have</p> <p>12 non-asbestiform tremolite, that when it's ground,</p> <p>13 it can produce thin, straight particles which</p> <p>14 conform to the definition of "fibers"?</p> <p>15 MR. FROST: Objection --</p> <p>16 BY MR. PLACITELLA:</p> <p>17 Q Do you agree with that?</p> <p>18 MR. FROST: Objection to form.</p> <p>19 THE WITNESS: I -- I cannot agree when I</p> <p>20 don't know "the definition of 'fibers'" that this</p> <p>21 is referring to or in "the method," which I also</p> <p>22 don't know what they're referring to.</p> <p>23 BY MR. PLACITELLA:</p> <p>24 Q Okay. In this case you were hired only</p> <p>25 by Johnson & Johnson or were you hired by other</p>	<p style="text-align: right;">Page 201</p> <p>1 not know of any outside electron microscopy method</p> <p>2 that uses Wylie's definition."</p> <p>3 Do you see that?</p> <p>4 MR. FROST: Objection to form.</p> <p>5 THE WITNESS: I'm sorry. What page are</p> <p>6 we on? I just --</p> <p>7 BY MR. PLACITELLA:</p> <p>8 Q Page --</p> <p>9 MR. FROST: Page 6, I believe.</p> <p>10 MR. PLACITELLA: -- 6.</p> <p>11 THE WITNESS: All right.</p> <p>12 BY MR. PLACITELLA:</p> <p>13 Q Do you agree with this sentence?</p> <p>14 A Are we reading J --</p> <p>15 Q Yes, ma'am.</p> <p>16 A -- WP note?</p> <p>17 Q And I think your quote is right</p> <p>18 underneath it.</p> <p>19 MR. FROST: Who is it to? I believe</p> <p>20 it's more than one sentence.</p> <p>21 MR. PLACITELLA: Yeah.</p> <p>22 THE WITNESS: Okay. What are you asking</p> <p>23 me to agree to?</p> <p>24 BY MR. PLACITELLA:</p> <p>25 Q I'm asking whether you agree with this</p>

<p style="text-align: right;">Page 202</p> <p>1 statement by Julie Pier that says: "The 2 asbestiform morphological criteria," as defined by 3 you, Ann Wylie, "may not apply to fibers that have 4 been aggressively milled and area of the size 5 range below the resolution of the light 6 microscope." 7 Do you agree with that? 8 MR. FROST: Objection to form. 9 THE WITNESS: When I was -- I need to 10 give you a little context. 11 When I was working with the Bureau of 12 Mines, we aggressively milled asbestos, and we had 13 no problem identifying it by those criteria 14 following aggressive milling. 15 BY MR. PLACITELLA: 16 Q Well, you aggressively milled asbestos. 17 I'm not talking about aggressively milling 18 asbestos. Here they're -- they're talking about 19 aggressively -- well, scratch that. I withdraw 20 that statement. 21 A Okay. 22 Q So when you aggressively milled 23 asbestos, when you -- and you say you did work 24 with the Bureau of Mines? 25 A The Bureau of Mines aggressively milled</p>	<p style="text-align: right;">Page 204</p> <p>1 you apply definitions to particles you can't see 2 by polarized light microscopy, of course you 3 cannot. 4 BY MR. PLACITELLA: 5 Q Okay. Fair enough. 6 I want to see if I can -- I got your 7 tests down correctly when asking you the question, 8 okay? 9 Assume that you have a particle that has 10 the following characteristics: The morphology of 11 a single fiber with a 3-to-1 aspect ratio, 12 parallel sides, more than 5 microns long. 13 Are you with me so far? 14 A Yes. 15 Q And chemical signature of tremolite as 16 determined by EDS or EDXA. 17 Are you with me? 18 A Yes. 19 Q Okay. And the crystalline structure 20 consistent with amphibole asbestos. 21 Are you with me? 22 A There is -- 23 MR. FROST: Objection to form. 24 THE WITNESS: There is no structure 25 typical of amphibole asbestos.</p>
<p style="text-align: right;">Page 203</p> <p>1 it. 2 Q Okay. You still found asbestos below 3 the limit of detection in a light microscope? 4 MR. FROST: Objection to form. 5 THE WITNESS: Found -- I'm sorry, but 6 again your question is not terribly clear. You 7 asked me if we found asbestos below the resolution 8 of the light microscope? 9 BY MR. PLACITELLA: 10 Q Well, you refer -- you responded to my 11 question about milling of asbestos. 12 A Yes. 13 Q Okay. And when you're -- when you say 14 that, you're talking about undisputed asbestos 15 products, correct? 16 A I'm talking about asbestos, yes. 17 Q Right. Okay. 18 So that's what I'm asking you. Do you 19 agree with the statement by Pier that asbestiform 20 morphological criteria, as defined by you, may not 21 apply to fibers that have been aggressively milled 22 and are of the size range below the resolution of 23 the light microscope? 24 MR. FROST: Objection to form. 25 THE WITNESS: If the question is, can</p>	<p style="text-align: right;">Page 205</p> <p>1 BY MR. PLACITELLA: 2 Q Oh. So there is no structure? 3 A Typical of amphibole asbestos. 4 Structures typical of amphibole. 5 Q Okay. Crystalline structure consistent 6 with amphibole. 7 A Amphibole. 8 Q Okay. What analytical techniques are 9 necessary to tell whether that fiber-shaped 10 particle grew in an asbestiform habit or not? 11 A A single particle, you can't make a 12 distinction necessarily. Necessarily. 13 Q Okay. So if you're looking at a single 14 fibril under a microscope, the light microscope, 15 you can't tell whether it grew in an asbestiform 16 habit or not. Correct? 17 A That's not what I said. 18 MR. FROST: Objection to form. 19 BY MR. PLACITELLA: 20 Q Okay. 21 A You asked me if I had a particle that 22 was 5 micrometers long -- 23 Q Okay. 24 A -- and it had parallel sides -- 25 Q Okay.</p>

<p style="text-align: right;">Page 206</p> <p>1 A -- and it had a 3-to-1 aspect ratio, if 2 I could tell by that single particle whether it 3 formed an asbestiform habit or was formed by 4 cleavage, I think would be the alternative. 5 Q Okay. 6 A And I normally don't -- unless there 7 were properties there, and they're optimal 8 properties, they had -- it had anomalous optical 9 properties, I would be able to tell. 10 Q But if it's not there, you can't tell. 11 A But if -- that's -- that's right. 12 Q Okay. And same assumptions, what 13 analytical techniques are available that would 14 allow you to test the textile -- tensile strength 15 and flexibility of that particle? 16 A For a 5 micrometer particle, there are 17 none. 18 Q Okay. Assuming you have a particle -- 19 if you have particles exactly of the same size and 20 shape, chemically, surface area and surface 21 charge, can you tell the difference between what's 22 an asbestiform and non-asbestiform tremolite? 23 MR. FROST: Objection to form. 24 THE WITNESS: I can't answer your 25 question. It's too hypothetical.</p>	<p style="text-align: right;">Page 208</p> <p>1 on individual particles. This is an optical 2 micrograph, and which is inserted a red-1 3 compensator, and so it obscures some of the 4 optical properties. I don't know whether -- what 5 it would look like under crossed nicols. There 6 are other tests to be looked at. So... 7 BY MR. PLACITELLA: 8 Q Well, this is under a microscope that 9 you use, though, right? 10 A Well, yes, but -- 11 MR. FROST: Objection to form. 12 THE WITNESS: -- you put a phase 1 -- 13 you put a phase 1 retardation plate within the 14 microscope system, so you're losing information. 15 BY MR. PLACITELLA: 16 Q Okay. So on this slide -- you can't 17 tell from looking at this slide whether this is a 18 cleavage fragment or asbestiform tremble -- 19 tremolite, correct? 20 MR. FROST: Objection to form. 21 THE WITNESS: I could only guess. 22 BY MR. PLACITELLA: 23 Q Okay. So does that help you? 24 MR. FROST: Objection to form. 25 THE WITNESS: I suppose that's what</p>
<p style="text-align: right;">Page 207</p> <p>1 MR. PLACITELLA: Sorry. Oh, that's not 2 very clear. Is there a way to turn -- turn that 3 light off? 4 MR. FROST: Yeah, it's not particularly 5 clear on the screen either, though, or on the TV 6 monitor. 7 MR. PLACITELLA: Can we turn the 8 light -- at least turn the light off? 9 MR. FROST: I was going to say we can 10 try, I guess. 11 BY MR. PLACITELLA: 12 Q So this appeared in an article by Harper 13 in 2008, and in looking at these photomicrographs, 14 are you able to tell what -- which one is 15 asbestiform tremolite and which one is a cleavage 16 fragment? 17 MR. FROST: Objection to form. 18 THE WITNESS: So you're telling me that 19 one is a cleavage fragment and one is a fiber? Is 20 that what you're telling me? 21 BY MR. PLACITELLA: 22 Q Or both. Can you tell whether either of 23 them are a cleavage fragment? 24 MR. LOCKE: Objection to form. 25 THE WITNESS: I do not make distinctions</p>	<p style="text-align: right;">Page 209</p> <p>1 Harper says. If I had guessed, I probably would 2 have gone that way. But I don't guess. 3 BY MR. PLACITELLA: 4 Q Okay. Now -- I have another slide up 5 here, and can you describe what you're seeing? 6 A I see elongated mineral particles. 7 Q Okay. And what kind of output? 8 A Oh -- well, number 1 and 4 are pretty 9 clearly from transmission electron microscopy, 10 because I recognize the filter background. 2 and 11 3, I -- I don't know. 12 Q Are we looking at cleavage fragments or 13 asbestos here? 14 MR. FROST: Objection to form. 15 THE WITNESS: As I said before, I don't 16 make determinations based on individual particles, 17 unless I have other information. 18 BY MR. PLACITELLA: 19 Q Well -- 20 A This is TEM. 21 Q Okay. So using this slide, you can't 22 tell whether these are cleavage fragments or 23 asbestos. Is that fair? 24 MR. FROST: Objection to form. 25 THE WITNESS: I can guess.</p>

<p style="text-align: right;">Page 210</p> <p>1 BY MR. PLACITELLA:</p> <p>2 Q Well, I don't want you to guess.</p> <p>3 A Okay.</p> <p>4 Q You can't tell.</p> <p>5 MR. FROST: Objection to form.</p> <p>6 THE WITNESS: I would -- let me just say</p> <p>7 there -- there are properties of cleavage</p> <p>8 fragments on number 1.</p> <p>9 Number 2 looks like two different</p> <p>10 minerals to me, but I don't know what -- you know,</p> <p>11 I don't know what they are.</p> <p>12 Number 3, similarly, it looks to me like</p> <p>13 one mineral and another coating it, so I really</p> <p>14 don't -- it's obscuring the characteristics.</p> <p>15 Number 4 has characteristics that would</p> <p>16 be consistent with cleavage fragments. But,</p> <p>17 again, you know, I'd have to look at the</p> <p>18 population at many particles before I would be</p> <p>19 willing to do anything other than guess.</p> <p>20 BY MR. PLACITELLA:</p> <p>21 Q So, as we sit here today, it's your</p> <p>22 testimony that looking at a single particle or</p> <p>23 fiber using a polarized light microscopy, you</p> <p>24 cannot make the call about whether that's asbestos</p> <p>25 or not?</p>	<p style="text-align: right;">Page 212</p> <p>1 A Yes.</p> <p>2 Q And is it your testimony that you can't</p> <p>3 look at these photomicrographs and make a call</p> <p>4 about whether they are asbestos or not on a single</p> <p>5 particle or fiber basis?</p> <p>6 MR. FROST: Objection to form.</p> <p>7 BY MR. PLACITELLA:</p> <p>8 Q Is that what you're saying?</p> <p>9 A I never or almost never try to make</p> <p>10 distinctions on single particles unless the</p> <p>11 properties are very clear.</p> <p>12 On sample 1, there are -- there is a</p> <p>13 stepwise pattern at the end of the particle that</p> <p>14 suggests cleavage, but the -- and the particle is</p> <p>15 not regular in its width through the entire</p> <p>16 length. And that would be the case of also</p> <p>17 number 4. These would lead me to suspect that</p> <p>18 they are cleavage fragments.</p> <p>19 Q Okay. But you can't state within a</p> <p>20 reasonable degree of scientific certainty that</p> <p>21 these are asbestos or cleavage fragments, given</p> <p>22 the information you have.</p> <p>23 MR. FROST: Objection to form.</p> <p>24 BY MR. PLACITELLA:</p> <p>25 Q Correct?</p>
<p style="text-align: right;">Page 211</p> <p>1 MR. FROST: Objection to form.</p> <p>2 BY MR. PLACITELLA:</p> <p>3 Q Correct?</p> <p>4 A No. You asked me to look at the</p> <p>5 polarized light micrographs in the previous slide,</p> <p>6 in which a red-1 compensator had been inserted,</p> <p>7 and which the optical properties are therefore</p> <p>8 obscured other than a sign of elongation. So</p> <p>9 there's no other information.</p> <p>10 So I'm not going to tell you that I</p> <p>11 couldn't look at that particle and study it in</p> <p>12 more detail, and with the other properties, the</p> <p>13 nine or ten properties that I listed, and tell</p> <p>14 you. I would have better -- be better able to do</p> <p>15 that because the asbestos has anomalous</p> <p>16 properties.</p> <p>17 Q All right. What I'm asking -- what I'm</p> <p>18 asking you -- okay, we left that. This -- these</p> <p>19 are TEM up here on the screen?</p> <p>20 A Yes. The question you asked me included</p> <p>21 polarized light. I'm sorry.</p> <p>22 Q That was my mistake.</p> <p>23 A Okay.</p> <p>24 Q What we have here are photomicrographs</p> <p>25 of TEM, correct?</p>	<p style="text-align: right;">Page 213</p> <p>1 A I can't make distinctions. I rely on</p> <p>2 populations.</p> <p>3 Q Okay. Okay.</p> <p>4 MR. FROST: Do you want to take a break</p> <p>5 now, Chris --</p> <p>6 MR. PLACITELLA: Hold one second.</p> <p>7 MR. FROST: -- unless you have more of</p> <p>8 these?</p> <p>9 MR. PLACITELLA: Hold one second. No, I</p> <p>10 just have this one I want to --</p> <p>11 BY MR. PLACITELLA:</p> <p>12 Q So 1 is a sample from RJ Lee Group,</p> <p>13 cleavage fragment.</p> <p>14 A Mm-hmm.</p> <p>15 Q 3 is asbestos, that's from the NIST</p> <p>16 reference material. You've seen that before, I</p> <p>17 assume.</p> <p>18 A Mm-hmm.</p> <p>19 Q Okay. 2 was asbestos, and 4 was</p> <p>20 cleavage fragment.</p> <p>21 A Mm-hmm.</p> <p>22 Q Correct?</p> <p>23 A Mm-hmm.</p> <p>24 Q Okay. Now, one more --</p> <p>25 MR. FROST: Objection to form based</p>

<p style="text-align: right;">Page 214</p> <p>1 on --</p> <p>2 MR. PLACITELLA: I have one more</p> <p>3 question, then we can take a break.</p> <p>4 THE WITNESS: Actually, there's nothing</p> <p>5 in here that tells me where they're from.</p> <p>6 BY MR. PLACITELLA:</p> <p>7 Q Okay.</p> <p>8 A So I -- I said correct. I'm going to</p> <p>9 redraw that. I can't say correct. There's</p> <p>10 nothing in there that tells me if these are</p> <p>11 cleavage fragments or fiber.</p> <p>12 Could we go back and look?</p> <p>13 Q What's your issue?</p> <p>14 A That I agreed to something I'm not sure</p> <p>15 is true.</p> <p>16 Q Oh.</p> <p>17 A I'd like very much --</p> <p>18 Q I was just reading to you what was on</p> <p>19 the screen. You don't have to agree or disagree.</p> <p>20 A Okay.</p> <p>21 Q Okay?</p> <p>22 A All right.</p> <p>23 Q So I want to show you -- can you tell me</p> <p>24 if that is asbestos or a cleavage fragment?</p> <p>25 MR. LOCKE: Objection to form.</p>	<p style="text-align: right;">Page 216</p> <p>1 like it's composite. I'm not at all clear what's</p> <p>2 going on. The width is uneven through its length,</p> <p>3 and that would be unusual for asbestos.</p> <p>4 BY MR. PLACITELLA:</p> <p>5 Q So you believe it's a cleavage fragment?</p> <p>6 A I didn't say that.</p> <p>7 MR. FROST: Objection to form.</p> <p>8 BY MR. PLACITELLA:</p> <p>9 Q You can't tell.</p> <p>10 A I said it would be unusual for it to be.</p> <p>11 Q Okay.</p> <p>12 A I would not expect it to be asbestos for</p> <p>13 that reason.</p> <p>14 Q Okay. But as you --</p> <p>15 A But it's a coat -- coating on it. It</p> <p>16 looks to be like there's more than one mineral,</p> <p>17 and so we're not really -- it's not really fair.</p> <p>18 It looks like more than one mineral.</p> <p>19 Q Well, I'm -- I can't be fair or unfair.</p> <p>20 That's why I'm just asking you your opinion.</p> <p>21 A It looks like more than one mineral.</p> <p>22 Q Okay. Now --</p> <p>23 MR. PLACITELLA: You wanted to take a</p> <p>24 break, that's fine.</p> <p>25 MR. FROST: Yeah, is this a good time?</p>
<p style="text-align: right;">Page 215</p> <p>1 THE WITNESS: I've told you before that</p> <p>2 I'm very unwilling to -- unless there's clear --</p> <p>3 and I said that in report -- unless there are</p> <p>4 clear characteristics that you can see for</p> <p>5 cleavage fragments or for fiber to make</p> <p>6 distinctions on a particle-by-particle basis, it's</p> <p>7 not reasonably sound.</p> <p>8 BY MR. PLACITELLA:</p> <p>9 Q Okay. So in looking at this particular</p> <p>10 photo -- by the way, what's -- so the record is</p> <p>11 clear, what's this an output of?</p> <p>12 A Well, you gave it to me. Perhaps you</p> <p>13 should tell me.</p> <p>14 Q Well, do -- do you know whether it's</p> <p>15 from TEM, PLM? What is it?</p> <p>16 MR. FROST: Objection to form.</p> <p>17 THE WITNESS: It appears to be from TEM.</p> <p>18 I see the holes in the filter, so --</p> <p>19 BY MR. PLACITELLA:</p> <p>20 Q Right. And from looking at this TEM --</p> <p>21 this particle under TEM, you can't tell as you sit</p> <p>22 here whether that's a cleavage fragment or</p> <p>23 asbestos, correct?</p> <p>24 MR. FROST: Objection to form.</p> <p>25 THE WITNESS: You know, it looks to me</p>	<p style="text-align: right;">Page 217</p> <p>1 MR. PLACITELLA: Yeah, a break is fine.</p> <p>2 THE VIDEOGRAPHER: The time is</p> <p>3 2:56 p.m., and we're going off the record.</p> <p>4 (Recess.)</p> <p>5 THE VIDEOGRAPHER: The time is 3:44</p> <p>6 p.m., and we are back on the record.</p> <p>7 MR. PLACITELLA: Okay. I always like to</p> <p>8 tell people where I am and where I'm going, so I'm</p> <p>9 about 15 minutes, give or take, until we're done.</p> <p>10 Okay.</p> <p>11 BY MR. PLACITELLA:</p> <p>12 Q Okay. I just wanted to go back, finish</p> <p>13 this line of questioning and then move to a</p> <p>14 different place.</p> <p>15 So I put up here three other slides.</p> <p>16 Are you able to tell from looking at these slides</p> <p>17 whether they represent asbestos or cleavage</p> <p>18 fragment?</p> <p>19 A I can't read the scale.</p> <p>20 MR. FROST: Objection to form.</p> <p>21 BY MR. PLACITELLA:</p> <p>22 Q I guess I can't either.</p> <p>23 Nope. Sorry. That's the best I can do.</p> <p>24 Can you tell whether it's cleavage</p> <p>25 fragments or asbestos?</p>

<p style="text-align: right;">Page 218</p> <p>1 A No.</p> <p>2 Q Okay. And one last one. See if I can</p> <p>3 get this so you can -- that's big enough,</p> <p>4 hopefully.</p> <p>5 Can you tell whether that slide is a</p> <p>6 cleavage frag- -- fragment or asbestos?</p> <p>7 MR. FROST: Objection to form.</p> <p>8 THE WITNESS: There's no scale.</p> <p>9 BY MR. PLACITELLA:</p> <p>10 Q So you need a scale in order to make</p> <p>11 that assessment?</p> <p>12 A I need a scale.</p> <p>13 Q So does -- does that help you in any</p> <p>14 way?</p> <p>15 A Yes.</p> <p>16 Q Okay. So is it a cleavage fragment or</p> <p>17 asbestos?</p> <p>18 A It's 0.7 micrometers in width.</p> <p>19 Q Mm-hmm.</p> <p>20 A And I see no evidence of fibril bundles.</p> <p>21 Q Mm-hmm.</p> <p>22 A So, again, with the understanding that I</p> <p>23 normally do not try to look at individual</p> <p>24 particles and put them in one bin or the other.</p> <p>25 Q Mm-hmm.</p>	<p style="text-align: right;">Page 220</p> <p>1 A I'm sorry, but you just can't tell me</p> <p>2 look at a particle and assume it's one mineral and</p> <p>3 ask such questions.</p> <p>4 It's 0.7 micrometers in width. I see no</p> <p>5 evidence of fiber bundling. So I would be</p> <p>6 inclined to conclude, given only that information</p> <p>7 and your assertion that it's tremolite, that it</p> <p>8 came from a cleavage fragment population.</p> <p>9 BY MR. PLACITELLA:</p> <p>10 Q Are you willing to testify to that</p> <p>11 within a reasonable degree of scientific</p> <p>12 certainty?</p> <p>13 MR. FROST: Objection to form.</p> <p>14 THE WITNESS: I've already said I</p> <p>15 normally don't do it on particle-by-particle</p> <p>16 basis.</p> <p>17 BY MR. PLACITELLA:</p> <p>18 Q Well, that's fine. If you say, No, I'm</p> <p>19 not willing to testify within a reasonable degree</p> <p>20 of scientific certainty, I'll move on. That's all</p> <p>21 I'm asking.</p> <p>22 A Aren't I testifying right here?</p> <p>23 Q Is that what -- is that your testimony?</p> <p>24 A My testimony is that, based on its width</p> <p>25 and the lack of any evidence of a fiber bundle,</p>
<p style="text-align: right;">Page 219</p> <p>1 A But given that, I would say it more</p> <p>2 closely resembles a cleavage fragment than an</p> <p>3 asbestos fiber.</p> <p>4 Q Can you say that within a reasonable</p> <p>5 degree of scientific certainty?</p> <p>6 A As I told you before, I normally do not</p> <p>7 try to look at individual particles.</p> <p>8 Q Okay. So that's why I'm asking you so</p> <p>9 the record is clear, and I'm fine with that, you</p> <p>10 can't state within a reasonable degree of</p> <p>11 scientific certainty whether this is a cleavage</p> <p>12 fragment or asbestos?</p> <p>13 MR. FROST: Objection to form.</p> <p>14 THE WITNESS: I don't know what the</p> <p>15 mineral is. It would be very difficult for me to</p> <p>16 make that determination when I don't even know</p> <p>17 what the mineral is.</p> <p>18 BY MR. PLACITELLA:</p> <p>19 Q Well, assume it's tremolite.</p> <p>20 A Well --</p> <p>21 Q Does that change anything?</p> <p>22 A Is it tremolite?</p> <p>23 MR. FROST: Same objection.</p> <p>24 BY MR. PLACITELLA:</p> <p>25 Q Just assume it's tremolite.</p>	<p style="text-align: right;">Page 221</p> <p>1 that I would conclude that it is most likely,</p> <p>2 within a reasonable degree of scientific</p> <p>3 certainty, but I can't tell you what it is -- but</p> <p>4 I would say it's most likely that it's a cleavage</p> <p>5 fragment.</p> <p>6 Q Okay. But you're not certain.</p> <p>7 A I don't even know that -- what the</p> <p>8 mineral is.</p> <p>9 Q Okay. So you're not certain.</p> <p>10 A I can't be certain --</p> <p>11 MR. FROST: Objection to form.</p> <p>12 THE WITNESS: -- unless I know what the</p> <p>13 mineral is.</p> <p>14 (Wylie Exhibit No. AW-51 was</p> <p>15 marked for identification.)</p> <p>16 MR. FROST: Wow, that's a lot of paper.</p> <p>17 BY MR. PLACITELLA:</p> <p>18 Q Okay. I'm going to show you what we've</p> <p>19 marked here -- can we go to -- as AW-51.</p> <p>20 Is this the Pooley report that you</p> <p>21 reviewed in preparation for your -- for your</p> <p>22 report?</p> <p>23 A Is there a date on it?</p> <p>24 Q This is as it was given. It was from --</p> <p>25 the second page says "From Light -- Lightfoot."</p>

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<p>1 A Yes.</p> <p>2 Q "Kingston and Pooley."</p> <p>3 A Yes. But it doesn't have a date.</p> <p>4 The -- I'd have -- I -- I'm not meaning to</p> <p>5 quibble. It -- I looked at a report by Lightfoot,</p> <p>6 et al., on the Italian mine, but there -- I had a</p> <p>7 date on the one I looked at. I don't see a date.</p> <p>8 MR. FROST: Here, it --</p> <p>9 THE WITNESS: Does it have a date?</p> <p>10 MR. FROST: This might help, Chris. I'm</p> <p>11 going to give her the one from --</p> <p>12 MR. PLACITELLA: Yeah, go ahead.</p> <p>13 MR. FROST: -- from the reliance</p> <p>14 materials. Is that the one --</p> <p>15 MR. PLACITELLA: Is that the same</p> <p>16 report?</p> <p>17 MR. FROST: That's what I'm going to</p> <p>18 have her check. Is that the one you're -- you're</p> <p>19 referencing?</p> <p>20 MR. PLACITELLA: It has the same exact</p> <p>21 title. That's why I was asking.</p> <p>22 THE WITNESS: Let me just look.</p> <p>23 MR. PLACITELLA: Sure.</p> <p>24 THE WITNESS: Without going through it</p> <p>25 page by page, it certainly appears to be the</p>	<p>1 have your own.</p> <p>2 Okay.</p> <p>3 BY MR. PLACITELLA:</p> <p>4 Q This was February of last year at the</p> <p>5 offices of Johnson & Johnson's attorneys.</p> <p>6 MR. FROST: Yeah, I'm going to object to</p> <p>7 this exhibit, Chris, to the extent it's just an</p> <p>8 excerpt from the deposition. It's not the full</p> <p>9 transcript.</p> <p>10 MR. PLACITELLA: That's fine.</p> <p>11 BY MR. PLACITELLA:</p> <p>12 Q You see I'm going to turn to page 428,</p> <p>13 where they -- by the way, when you were given the</p> <p>14 Pooley report, Exhibit 10, no one gave you his</p> <p>15 sworn testimony about what was in the report,</p> <p>16 correct?</p> <p>17 A No.</p> <p>18 Q Okay. Do you see here on page 428, it</p> <p>19 says:</p> <p>20 "Q. But we've got Exhibit 10,</p> <p>21 which is your report, and if he's</p> <p>22 reading your report on the very</p> <p>23 back, Fred Pooley, that's not what</p> <p>24 it says, is it?"</p> <p>25 "A. Uh-huh."</p>
Page 223	Page 225
<p>1 report I reviewed.</p> <p>2 BY MR. PLACITELLA:</p> <p>3 Q Okay. And --</p> <p>4 MR. FROST: Here, why don't you use the</p> <p>5 one you reviewed. We can mark yours, and that way</p> <p>6 if there is a distinction between the two, we'll</p> <p>7 know pretty quickly during questioning.</p> <p>8 BY MR. PLACITELLA:</p> <p>9 Q Okay. Well, it's -- the title is</p> <p>10 exactly the same --</p> <p>11 A Yes.</p> <p>12 Q -- as in your paper, correct?</p> <p>13 A Yes. And the first page is the same.</p> <p>14 Q Exactly the same. Okay. And that's --</p> <p>15 A Well --</p> <p>16 Q If you see AW-51, it also was Pooley 10.</p> <p>17 Do you see that?</p> <p>18 A Yes.</p> <p>19 Q Okay. Now --</p> <p>20 MR. PLACITELLA: Hand that down.</p> <p>21 BY MR. PLACITELLA:</p> <p>22 Q Now, I'm going to show you and hand you</p> <p>23 a copy of the testimony from Dr. Pooley concerning</p> <p>24 this exact study.</p> <p>25 MR. PLACITELLA: Hold on. You guys each</p>	<p>1 "Q. Mr. Bicks has inadequately</p> <p>2 quoted this report. Particles</p> <p>3 formed from the amphibole mineral</p> <p>4 found at the mine were hardly</p> <p>5 fibrous."</p> <p>6 "A. Yeah."</p> <p>7 "Q. 'The majority broke to give</p> <p>8 compact particles.'" They got too</p> <p>9 small. Doesn't that mean all of</p> <p>10 them did, does it?</p> <p>11 "Doesn't mean all of them</p> <p>12 did, does it?"</p> <p>13 "A. Nope."</p> <p>14 So he must have been doing this in an</p> <p>15 English accent. It would have probably sounded</p> <p>16 much better.</p> <p>17 Then he says:</p> <p>18 "Q. So he didn't quote it here,</p> <p>19 but you found tremolite that was</p> <p>20 asbestiform that didn't break</p> <p>21 apart, didn't you."</p> <p>22 Answer by the witness:</p> <p>23 "A. Yes. A few particles, yes."</p> <p>24 Were -- were you aware --</p> <p>25 MR. FROST: Well, hold on. First, I'm</p>

<p style="text-align: right;">Page 226</p> <p>1 going to object as to completeness. They're 2 clearly referring to another part of the 3 transcript here, which you have not included. 4 Therefore, I would object to the sort of small 5 cherry-picked assertion we have here about 10, 6 when it clearly is quoting to other portions of 7 the transcript that are not included here, which I 8 fear are needed for context in order to answer 9 this question. 10 BY MR. PLACITELLA: 11 Q Okay. Putting that form objection 12 aside, were you aware that Dr. Pooley had 13 testified under oath that he found asbestiform 14 tremolite in the Italian talc? 15 MR. FROST: Objection to form. 16 THE WITNESS: I was not. 17 BY MR. PLACITELLA: 18 Q Okay. Now, I know you indicated before 19 that you only looked at information related to the 20 geology of the mines. Is that fair? 21 MR. FROST: Objection to form. 22 THE WITNESS: Say it -- say it one more 23 time. 24 BY MR. PLACITELLA: 25 Q Well, let me ask the question this way.</p>	<p style="text-align: right;">Page 228</p> <p>1 take any issue with that. Is that fair? 2 A That's fair. 3 Q Okay. So in terms of the methodology 4 that he used, that is the concentration technique 5 and at least the PLM, you don't have a 6 disagreement, correct? 7 A Oh, yes, I do. 8 MR. FROST: Objection to form. 9 BY MR. PLACITELLA: 10 Q You do. 11 A (The witness nods.) 12 Q So you disagree with the fact that he 13 used PLM? 14 MR. FROST: Objection to form. 15 Misstates testimony. 16 MR. PLACITELLA: Well, let me just -- 17 let me just -- maybe because it was a compound 18 question. 19 BY MR. PLACITELLA: 20 Q Do you disagree with the fact that he 21 used PLM? 22 A No. 23 Q Okay. Do you disagree with the fact 24 that he used the concentration technique? 25 A No.</p>
<p style="text-align: right;">Page 227</p> <p>1 A Okay. 2 Q Part of what you did in this case is you 3 looked at the actual -- a report by Dr. Longo of 4 the baby powder that he looked at under a 5 microscope, correct? 6 A I did look at that. 7 Q Okay. And he -- he used TEM, correct? 8 A Yes. 9 Q And you used TEM, correct? 10 MR. FROST: Objection to form. 11 BY MR. PLACITELLA: 12 Q It's one of the -- it's one of the 13 methods that you used to test for asbestos, 14 correct? 15 A I don't think I've ever used TEM to test 16 for the presence of asbestos. 17 Q Okay. And he used PLM, correct? 18 A Yes. 19 Q And you used PLM, correct? 20 A Yes. 21 Q He mentioned using a concentration 22 technique. Do you recall that? 23 A Yes. 24 Q And you mention in your report that he 25 used a concentration technique, but you didn't</p>	<p style="text-align: right;">Page 229</p> <p>1 Q Okay. You looked at the same photos 2 that he did, correct? 3 A Yes. 4 Q And you reached a different conclusion. 5 Correct? 6 A Yes. 7 MR. FROST: Objection to form. 8 BY MR. PLACITELLA: 9 Q Okay. Now -- and when you -- when you 10 did your analysis, you understood that what 11 would -- what you would find in the end product, 12 you wouldn't find asbestos or tremolite or 13 anything else in the end product if it wasn't in 14 the talc from the mine, correct? 15 MR. FROST: Objection to form. 16 THE WITNESS: Unless they added it. 17 BY MR. PLACITELLA: 18 Q Right. 19 A Yes. 20 Q Okay. So on Hopkins 28, in terms of -- 21 and I'm not going to go through it all now, I 22 promise you -- all of these tests that were done 23 of the actual product, that would be relevant to 24 whether -- to the conclusion about whether there 25 was asbestos in Johnson's Baby Powder or Shower to</p>

<p style="text-align: right;">Page 230</p> <p>1 Shower, correct?</p> <p>2 MR. FROST: Objection to form.</p> <p>3 THE WITNESS: Would you mind repeating</p> <p>4 the question? I got a little bit distracted.</p> <p>5 BY MR. PLACITELLA:</p> <p>6 Q Sure.</p> <p>7 A Okay.</p> <p>8 Q On Hopkins 28, we didn't go through it</p> <p>9 in detail. That's this spreadsheet.</p> <p>10 A Okay. Okay.</p> <p>11 Q There are a number of -- there are many</p> <p>12 tests related to the end product.</p> <p>13 A Yes.</p> <p>14 Q Okay. Although you looked at the</p> <p>15 testing of the end product by Dr. Longo, you were</p> <p>16 not provided any of the test results concerning</p> <p>17 the end product on Hopkins 28 to determine whether</p> <p>18 it supported or refuted Dr. Longo conclusions or</p> <p>19 your conclusions.</p> <p>20 MR. FROST: Objection to form.</p> <p>21 BY MR. PLACITELLA:</p> <p>22 Q Correct?</p> <p>23 A I did not look at any of those doc- --</p> <p>24 at any of those documents.</p> <p>25 Q Okay. Nor were they provided to you.</p>	<p style="text-align: right;">Page 232</p> <p>1 Q I passed. Okay. Well, I guess that's</p> <p>2 good for you.</p> <p>3 You were -- questions were asked --</p> <p>4 A But I did make some clarifications.</p> <p>5 Q That's fine. That's what -- I told you</p> <p>6 you could do that.</p> <p>7 A I know. I just wanted to be sure.</p> <p>8 Q When the teacher --</p> <p>9 A Passing is not necessarily an A.</p> <p>10 Q In geology, give me a B. I'm fine,</p> <p>11 okay?</p> <p>12 All right. Some questions were asked</p> <p>13 about your deposition. I want to know if you know</p> <p>14 the answers.</p> <p>15 Did you ever have any communications</p> <p>16 with Mickey Gunther concerning the work you were</p> <p>17 doing in this case?</p> <p>18 A No.</p> <p>19 Q Okay. Did you ever have any</p> <p>20 communications with Mickey Gunther on the subject</p> <p>21 of whether there's asbestos in Vermont talc?</p> <p>22 MR. FROST: Objection to form.</p> <p>23 THE WITNESS: Not that I recollect, no.</p> <p>24 BY MR. PLACITELLA:</p> <p>25 Q Okay. Did you have any communications</p>
<p style="text-align: right;">Page 231</p> <p>1 MR. FROST: Objection to form.</p> <p>2 THE WITNESS: No.</p> <p>3 BY MR. PLACITELLA:</p> <p>4 Q Okay. Now, you were -- you were going</p> <p>5 to take a look at my tests during the break. Did</p> <p>6 you do that?</p> <p>7 A I did.</p> <p>8 Q Okay. Do you have that with you?</p> <p>9 A Not yet.</p> <p>10 Q Okay.</p> <p>11 A Why?</p> <p>12 Q What did I get?</p> <p>13 A No, I -- you know --</p> <p>14 MR. FROST: We need a couple more</p> <p>15 minutes. If you want, we can take a break and get</p> <p>16 it and bring it back.</p> <p>17 MR. PLACITELLA: No. Could somebody go</p> <p>18 get it?</p> <p>19 MR. FROST: It's not done yet.</p> <p>20 BY MR. PLACITELLA:</p> <p>21 Q I mean, did I get a B? An A? What did</p> <p>22 I get?</p> <p>23 A You passed.</p> <p>24 MR. FROST: Objection to form.</p> <p>25 BY MR. PLACITELLA:</p>	<p style="text-align: right;">Page 233</p> <p>1 or conversations with RJ Lee or Matt Sanchez</p> <p>2 concerning your opinions in this case?</p> <p>3 A No.</p> <p>4 Q Okay. Did you ever have any</p> <p>5 communications with RJ Lee or Matt Sanchez</p> <p>6 concerning the issue of whether there's asbestos</p> <p>7 in Vermont talc?</p> <p>8 A No.</p> <p>9 Q Okay. Did you ever do any work for</p> <p>10 Colgate Palmolive?</p> <p>11 MR. FROST: Objection to form.</p> <p>12 THE WITNESS: I met -- no. No. I was</p> <p>13 never paid by Colgate Palmolive.</p> <p>14 BY MR. PLACITELLA:</p> <p>15 Q Were you ever consulted by Colgate</p> <p>16 Palmolive?</p> <p>17 A I think there were lawyers that came to</p> <p>18 talk with me, but -- from Colgate Palmolive, but</p> <p>19 I -- I never did anything with that.</p> <p>20 Q How come?</p> <p>21 A They came and talked to me.</p> <p>22 Q How come?</p> <p>23 A I just didn't. I wasn't that interested</p> <p>24 in --</p> <p>25 Q Okay.</p>

<p style="text-align: right;">Page 234</p> <p>1 A -- doing litigation type work.</p> <p>2 Q Did you do any testing for them?</p> <p>3 A No.</p> <p>4 Q Okay. What about Cyprus Mines, did you</p> <p>5 ever do any work for them?</p> <p>6 MR. FROST: Objection to form.</p> <p>7 THE WITNESS: Long ago, I -- I did</p> <p>8 analyze some samples for them.</p> <p>9 BY MR. PLACITELLA:</p> <p>10 Q Okay. And in what context?</p> <p>11 MR. FROST: Objection to form.</p> <p>12 THE WITNESS: They probably sent them to</p> <p>13 me.</p> <p>14 BY MR. PLACITELLA:</p> <p>15 Q Was it in the context of litigation or</p> <p>16 in just the normal course of their business?</p> <p>17 A I think just the normal -- I believe, to</p> <p>18 the best of my recollection, the normal course of</p> <p>19 their business.</p> <p>20 Q Who was the person at Cyprus that you</p> <p>21 dealt with, do you recall?</p> <p>22 A No.</p> <p>23 Q Do you recall what you found?</p> <p>24 A No.</p> <p>25 MR. FROST: Objection to form.</p>	<p style="text-align: right;">Page 236</p> <p>1 particle is its length divided by its width.</p> <p>2 That's what it is.</p> <p>3 Q Oh, so you don't have to count the</p> <p>4 fibrils that make up a bundle? When you say "mean</p> <p>5 aspect ratio," you're just saying it's the -- the</p> <p>6 length divided by the width?</p> <p>7 A That's correct.</p> <p>8 Q Okay. Now, did you base your aspect</p> <p>9 ratio of 20-to-1 on the 1984 paper that we went</p> <p>10 through before?</p> <p>11 MR. FROST: Objection to form.</p> <p>12 BY MR. PLACITELLA:</p> <p>13 Q You told me that you use a 20-to-1</p> <p>14 aspect ratio for PLM when looking at talc. Fair?</p> <p>15 A I look for all of the properties. And I</p> <p>16 look for fiber bundles, I look for high aspect</p> <p>17 ratio particles, I look for all of the properties.</p> <p>18 Q I'm giving you that. That's not my</p> <p>19 question.</p> <p>20 A Okay.</p> <p>21 Q So I want to just try to get on the same</p> <p>22 page.</p> <p>23 A Okay. All right.</p> <p>24 Q You -- I'm just talking about the aspect</p> <p>25 ratio --</p>
<p style="text-align: right;">Page 235</p> <p>1 MR. PLACITELLA: Okay. So I just want</p> <p>2 to make sure we have for the record, 53 is a</p> <p>3 curriculum vitae, so you have it.</p> <p>4 (Wylie Exhibit AW-53 was marked</p> <p>5 for identification.)</p> <p>6 MR. FROST: Is this the one --</p> <p>7 MR. PLACITELLA: Mm-hmm.</p> <p>8 MR. FROST: -- you referenced earlier?</p> <p>9 MR. PLACITELLA: Yes, the one I -- that</p> <p>10 we went and got copies of.</p> <p>11 AW-16 is the letter from Dr. Ashton to</p> <p>12 Dr. Wylie.</p> <p>13 BY MR. PLACITELLA:</p> <p>14 Q While we're waiting, you --</p> <p>15 (Counsel conferring.)</p> <p>16 BY MR. PLACITELLA:</p> <p>17 Q -- you mentioned before something known</p> <p>18 as a mean aspect ratio.</p> <p>19 A Yes.</p> <p>20 Q Could you explain that? How do you</p> <p>21 determine what a mean aspect ratio is?</p> <p>22 A You average measurements.</p> <p>23 Q How -- how do you average measurements</p> <p>24 of a fiber -- in a fiber bundle?</p> <p>25 A Well, the mean aspect ratio of the</p>	<p style="text-align: right;">Page 237</p> <p>1 A Yes.</p> <p>2 Q -- of 20-to-1.</p> <p>3 A Yes.</p> <p>4 Q What -- where did that come from?</p> <p>5 MR. FROST: Objection to form.</p> <p>6 THE WITNESS: Hmm, where did it come</p> <p>7 from? Probably measurements that were made</p> <p>8 with -- from the SEM. Observations on many</p> <p>9 asbestos samples that I made. It would be an</p> <p>10 approximation. You have under the microscope</p> <p>11 scales, and so you can kind of see what the aspect</p> <p>12 ratios are.</p> <p>13 BY MR. PLACITELLA:</p> <p>14 Q Okay. But you can't -- I'm probably</p> <p>15 just not making myself clear. I apologize. It's</p> <p>16 late in the day.</p> <p>17 You -- you use as a standard 20-to-1</p> <p>18 aspect ratio, correct?</p> <p>19 A No. I -- no.</p> <p>20 Q Go ahead.</p> <p>21 A I -- when -- when you asked me what my</p> <p>22 criteria were, I said an abundance of high aspect</p> <p>23 ratio particles.</p> <p>24 Q All right. 20-to-1.</p> <p>25 MR. FROST: Objection to form.</p>

<p style="text-align: right;">Page 238</p> <p>1 THE WITNESS: An abundance of high 2 aspect ratio particles with a mean. Mean. 3 BY MR. PLACITELLA: 4 Q Okay. 5 A A mean is not a 20-to-1. You can have a 6 10-to-1. 7 Q Okay. 8 A To get a mean, you have some are less 9 and some are greater. 10 Q Okay. 11 A And the more greater they are, the more 12 they weight the mean. 13 Q Okay. So you could have short ones and 14 some long ones, and that's how you get to 20. 15 MR. FROST: Objection to form. 16 THE WITNESS: Short ones and long ones, 17 that's how you get to 20. 18 You can have high aspect ratio -- you 19 can have 20-to-1 particles. You can have less 20 than 20-to-1 particles. 21 BY MR. PLACITELLA: 22 Q Okay. 23 A So -- but when you look at a population, 24 you find that -- the mean aspect ratio for the 25 populations that we measured. All right. It's</p>	<p style="text-align: right;">Page 240</p> <p>1 Q Okay. So the 20-to-1 aspect ratio -- 2 A Mean. 3 Q -- mean aspect ratio, had no 4 relationship to your 1984 paper that we went over 5 before? 6 MR. FROST: Objection to form. 7 BY MR. PLACITELLA: 8 Q You didn't get it from there? 9 MR. FROST: Objection to form. 10 THE WITNESS: I didn't get it from the 11 paper I wrote? 12 BY MR. PLACITELLA: 13 Q That's what I'm asking you. 14 A You mean I referenced -- I got it from 15 what I wrote? I would never. I mean I don't 16 understand your question. How could I get it from 17 what I wrote? 18 Q Well -- 19 A I wrote from the -- I got it from the 20 data. 21 Q Okay. Well, that's my question. You 22 didn't get it from the analysis that was in your 23 paper, the ASTM paper from 1984. 24 A Oh. I'm sorry. Where we were talking 25 about all those data that were listed, the air</p>
<p style="text-align: right;">Page 239</p> <p>1 one of the reasons why I said an abundance of high 2 aspect ratio particles being 20-to-1 or greater. 3 But a mean aspect ratio is -- encompasses all 4 particles longer than 5 micrometers. 5 Q Mm-hmm. 6 A Longer than 5 micrometers, and an 7 average of their aspect ratio. That's what the 8 word "mean" means. 9 Q Okay. Fair enough. 10 And I'm saying in the standard that you 11 apply, the 20 -- the mean aspect ratio 20-to-1, 12 all right, what is that based on? 13 A At the time we had -- I had measured 14 quite a few asbestos populations by scanning 15 electron microscopy, and I used that to check for 16 what I might be able to say would be a mean. 17 Q So you looked at bulk asbestos 18 populations? 19 A Yes. 20 Q Okay. And when you say "populations," 21 how is that defined when you came to that standard 22 of 20-to-1? 23 A Well, we measured -- "we" being the 24 Bureau of Mines -- you know, thousands of 25 particles.</p>	<p style="text-align: right;">Page 241</p> <p>1 samples and -- 2 Q Yes -- yes, Doctor. 3 A No. 4 Q Okay. You got that from a separate 5 analytical system that you did. 6 A Yes. 7 MR. PLACITELLA: Okay. Now -- well, I 8 said 15 minutes. I kept to it, but I still need 9 to see my tests. 10 THE WITNESS: Okay. 11 MR. FROST: Can we go off the record? 12 MR. PLACITELLA: Okay. Yep. 13 THE VIDEOGRAPHER: The time is 4:09 p.m. 14 We're going off the record. 15 (Recess.) 16 THE VIDEOGRAPHER: The time is 4:24 17 p.m., and we're back on the record. 18 BY MR. PLACITELLA: 19 Q Okay. Did you bring my tests with you? 20 A I did. 21 Q Okay. Just before we go there, would -- 22 do you agree that TEM is the gold standard for 23 testing for talc to determine whether there's 24 asbestos? 25 MR. FROST: Objection to form.</p>

<p style="text-align: right;">Page 242</p> <p>1 THE WITNESS: No.</p> <p>2 BY MR. PLACITELLA:</p> <p>3 Q Okay. Do you have 51?</p> <p>4 A Yes.</p> <p>5 MR. FROST: So --</p> <p>6 THE WITNESS: We need to look at them</p> <p>7 together.</p> <p>8 MR. FROST: I was going to say it might</p> <p>9 make sense for us to go through, tell you the</p> <p>10 changes, give it to you, and then you can ask</p> <p>11 her --</p> <p>12 BY MR. PLACITELLA:</p> <p>13 Q Well, why don't I just flip through it</p> <p>14 and put it up on the ELMO.</p> <p>15 A Oh, okay.</p> <p>16 Q Does that work?</p> <p>17 A Yes, that works.</p> <p>18 Q Or you can sit next to me.</p> <p>19 A No, that works.</p> <p>20 Q But I didn't think you would really</p> <p>21 want to do that at the end of the day.</p> <p>22 A I wouldn't be in the camera.</p> <p>23 Q Oh. Well, no, you get the camera this</p> <p>24 way. I mean, you probably wouldn't want it on</p> <p>25 record. Okay.</p>	<p style="text-align: right;">Page 244</p> <p>1 MR. FROST: Can you hand that to the</p> <p>2 court reporter.</p> <p>3 MR. PLACITELLA: Can we make it 50-A?</p> <p>4 MR. FROST: Sure.</p> <p>5 THE WITNESS: Okay.</p> <p>6 (Wylie Exhibit No. AW-50-A was</p> <p>7 marked for identification.)</p> <p>8 BY MR. PLACITELLA:</p> <p>9 Q Well -- okay. Sorry.</p> <p>10 What do you want me to do with this?</p> <p>11 A You had asked me what approach I would</p> <p>12 take for the identification of asbestos by</p> <p>13 polarized light microscopy, and we went through --</p> <p>14 Q Right.</p> <p>15 A -- a series, and it began on -- keep</p> <p>16 going -- the page there.</p> <p>17 Q Okay.</p> <p>18 A All right. And I rewrote that, just</p> <p>19 that page, and I think the next, and perhaps even</p> <p>20 the next, to be sure that it was complete and</p> <p>21 rigorous.</p> <p>22 I don't -- it isn't that what you had</p> <p>23 was so wrong. It's just that I don't normally</p> <p>24 want to agree with what someone else has read</p> <p>25 that -- written that I said. So I just rewrote it</p>
<p style="text-align: right;">Page 243</p> <p>1 All right. So --</p> <p>2 A I numbered your pages.</p> <p>3 Q Thank you.</p> <p>4 So I'm just going to keep going until I</p> <p>5 see something. How's that?</p> <p>6 A No, I'd like to go through it page by</p> <p>7 page --</p> <p>8 MR. FROST: Yeah, I was going to say --</p> <p>9 THE WITNESS: -- if you don't mind.</p> <p>10 MR. FROST: -- I think we should do it</p> <p>11 page by page.</p> <p>12 BY MR. PLACITELLA:</p> <p>13 Q Did you make any changes on number 1?</p> <p>14 A I would add, which I didn't add on the</p> <p>15 piece of paper, but I would certainly want to be</p> <p>16 put on the record that I have 45 years of</p> <p>17 experience that I also relied on.</p> <p>18 Q Actually, I was going to actually ask</p> <p>19 you what your diet was, because I think you look</p> <p>20 awesome. Okay? So put that aside. I assume you</p> <p>21 have experience.</p> <p>22 So I'm flipping through 3 --</p> <p>23 MR. FROST: Yeah, why don't we mark this</p> <p>24 as --</p> <p>25 MR. PLACITELLA: AW-50-A?</p>	<p style="text-align: right;">Page 245</p> <p>1 in a format with which I'm comfortable. So you</p> <p>2 could look that over and see if there's anything</p> <p>3 in what I've written here that we did not discuss.</p> <p>4 Q Okay. We'll you -- you wrote in 50-A.</p> <p>5 Did you do this by yourself or were in conjunction</p> <p>6 with your lawyer?</p> <p>7 A By myself.</p> <p>8 Q Okay. So before we get there, you still</p> <p>9 didn't give me a grade.</p> <p>10 MR. FROST: Well, handwriting or</p> <p>11 content?</p> <p>12 MR. PLACITELLA: No, on how I did here.</p> <p>13 THE WITNESS: B plus.</p> <p>14 MR. PLACITELLA: Okay, I'll take it.</p> <p>15 BY MR. PLACITELLA:</p> <p>16 Q Now, 50-A is your amendment to this</p> <p>17 entire pad, is that fair?</p> <p>18 A Not quite. I'd like to go through it</p> <p>19 page by page.</p> <p>20 Q Okay.</p> <p>21 Okay. I -- we'll put this in the</p> <p>22 record.</p> <p>23 A That's fine.</p> <p>24 Q That's fine. I mean your testimony is</p> <p>25 what it is, and we'll leave this as -- in the</p>

<p style="text-align: right;">Page 246</p> <p>1 record, okay?</p> <p>2 So let's go through 3.</p> <p>3 A That's amended there.</p> <p>4 Q Okay. 4?</p> <p>5 A If there's anything at the bottom,</p> <p>6 that -- that's all that shows. I can only see</p> <p>7 down to (c). Okay. Yes, that's amended in that</p> <p>8 or contributed.</p> <p>9 Q All right.</p> <p>10 A I -- I let that stand.</p> <p>11 Q Okay.</p> <p>12 A I let that stand.</p> <p>13 Q Okay. Population, page 6. I'm on</p> <p>14 page 7, fiber bundles.</p> <p>15 A I'll let that stand.</p> <p>16 Q Okay. Page 8?</p> <p>17 A Could you move it down a little bit so I</p> <p>18 can see the -- all right. Yes, I'll let that</p> <p>19 stand.</p> <p>20 Q Okay. Page 9, one of the regulated --</p> <p>21 we never actually wrote in it.</p> <p>22 Q Okay. Page 10?</p> <p>23 A I corrected "abundance greater than one"</p> <p>24 to reflect my comment that you need many more than</p> <p>25 one.</p>	<p style="text-align: right;">Page 248</p> <p>1 looking at the same sample that you are --</p> <p>2 A Yes.</p> <p>3 Q -- how would I know what to look at if I</p> <p>4 didn't have you whispering in my ear, That's too</p> <p>5 many, that's too little?</p> <p>6 MR. FROST: Objection to form.</p> <p>7 THE WITNESS: I -- I think I would just</p> <p>8 say, There are many more than one.</p> <p>9 BY MR. PLACITELLA:</p> <p>10 Q Okay. But we can't say how many?</p> <p>11 A No.</p> <p>12 Q Okay. Next.</p> <p>13 A That's in the -- it's listed in that</p> <p>14 correction that I gave you.</p> <p>15 Q Okay. But it's not required.</p> <p>16 A That's the way I -- yes, that's what</p> <p>17 mine says.</p> <p>18 Q Okay. 12?</p> <p>19 A Could I see what's down at the bottom?</p> <p>20 Q Uh-huh.</p> <p>21 A Yes.</p> <p>22 Q It's fine?</p> <p>23 A Mm-hmm.</p> <p>24 Q 13, you wrote?</p> <p>25 A That's -- those are my initials.</p>
<p style="text-align: right;">Page 247</p> <p>1 Q How many more?</p> <p>2 A I don't know. Many more.</p> <p>3 Q Well, do I need four Golden Retrievers?</p> <p>4 Five?</p> <p>5 MR. FROST: Objection to form.</p> <p>6 BY MR. PLACITELLA:</p> <p>7 Q I mean, how is somebody supposed to</p> <p>8 apply your method if they don't know what</p> <p>9 "abundance" means?</p> <p>10 MR. FROST: Objection to form.</p> <p>11 BY MR. PLACITELLA:</p> <p>12 Q Doctor, if you're -- you're going to</p> <p>13 teach somebody, I'm your student, and I'm saying,</p> <p>14 Well, what do you mean by abundance? How many</p> <p>15 Golden Retrievers do I have to look at? How many?</p> <p>16 A Many more than one.</p> <p>17 Q But you don't know.</p> <p>18 A It very much depends upon the</p> <p>19 characteristics. So, for example, if the</p> <p>20 particles were all totally uniform, you would need</p> <p>21 fewer.</p> <p>22 Q Okay.</p> <p>23 A If they're highly variable, you would</p> <p>24 need more.</p> <p>25 Q But a student applying your method</p>	<p style="text-align: right;">Page 249</p> <p>1 Q Right.</p> <p>2 A I crossed out "expected" and put</p> <p>3 "required."</p> <p>4 Q Put -- so you changed your mind.</p> <p>5 A Well, I use --</p> <p>6 Q You thought about it more.</p> <p>7 A I always use it, and I don't know of any</p> <p>8 instances where you have asbestos where you do not</p> <p>9 have anomalous properties.</p> <p>10 Q Okay.</p> <p>11 A So I -- I put "required."</p> <p>12 Q So your next article, that's what you're</p> <p>13 going to write?</p> <p>14 MR. FROST: Objection to form.</p> <p>15 BY MR. PLACITELLA:</p> <p>16 Q Yes?</p> <p>17 A I don't plan -- I'm not -- have any</p> <p>18 plans to write another article on this topic.</p> <p>19 Q You're done with this except for</p> <p>20 testifying?</p> <p>21 MR. FROST: Objection to form.</p> <p>22 THE WITNESS: No, I'm not done with</p> <p>23 this. What do you mean by "this"?</p> <p>24 BY MR. PLACITELLA:</p> <p>25 Q Well, you don't plan on publishing these</p>

<p style="text-align: right;">Page 250</p> <p>1 criteria?</p> <p>2 A I don't.</p> <p>3 Q Okay.</p> <p>4 A I have no -- I have no plans to do that.</p> <p>5 Q Okay. And that's the end of the pad,</p> <p>6 correct?</p> <p>7 A Yes.</p> <p>8 Q Okay. Now -- so I just have one</p> <p>9 question. I know you had a number of consults</p> <p>10 with Johnson & Johnson's attorney while I was</p> <p>11 eating cookies, and did any of the consults you</p> <p>12 had with Johnson & Johnson's attorneys cause you</p> <p>13 to change your testimony from today in any</p> <p>14 material way?</p> <p>15 MR. FROST: Well, objection to form.</p> <p>16 First off, the CMO regarding the</p> <p>17 deposition procedure is very clear that the</p> <p>18 negotiated resolution was any conferences during</p> <p>19 breaks were off limits from the deposition.</p> <p>20 MR. PLACITELLA: I'm not asking her the</p> <p>21 substance. I'm just asking whether any</p> <p>22 conferences with you and her and the other lawyers</p> <p>23 at Johnson & Johnson caused her to change her</p> <p>24 testimony in any material way.</p> <p>25 MR. FROST: And again, I think --</p>	<p style="text-align: right;">Page 252</p> <p>1 my objection is on the record.</p> <p>2 BY MR. PLACITELLA:</p> <p>3 Q Okay.</p> <p>4 A No.</p> <p>5 Q Okay.</p> <p>6 MR. PLACITELLA: The answer was much</p> <p>7 shorter than the objection.</p> <p>8 That's all my questions for now,</p> <p>9 depending on if your counsel has any questions.</p> <p>10 But -- oh, can we just -- well, we're</p> <p>11 just going to put these in the record. This is</p> <p>12 AW-44 and Hopkins 28.</p> <p>13 (Wylie Exhibit No. AW-44 was</p> <p>14 marked for identification.)</p> <p>15 MR. PLACITELLA: So take a look.</p> <p>16 And 50, if I get a copy -- if I get a</p> <p>17 copy of this, would you after, for Mr. Frost, put</p> <p>18 the "B+" on the copy?</p> <p>19 Okay. That's all I've got.</p> <p>20 MR. FROST: All right. Let's take a</p> <p>21 break. We do have some questions. And we're</p> <p>22 actually waiting for some things to be printed.</p> <p>23 THE VIDEOGRAPHER: The time is 4:34 p.m.</p> <p>24 and we're going off the record.</p> <p>25 (Wylie Exhibit No. AW-52 was</p>
<p style="text-align: right;">Page 251</p> <p>1 MR. PLACITELLA: That's all. I'm not</p> <p>2 asking her about what exactly was said.</p> <p>3 MR. FROST: Nope. Again, I think that's</p> <p>4 inappropriate. I think you're diving into</p> <p>5 attorney-client privilege. And frankly, I think</p> <p>6 you're breaking the procedure that was negotiated</p> <p>7 by both sides in this case.</p> <p>8 MR. PLACITELLA: I'm breaking procedure</p> <p>9 by asking that question?</p> <p>10 MS. O'DELL: I think he's clearly not</p> <p>11 asking the substance of the conversation.</p> <p>12 MR. PLACITELLA: Right.</p> <p>13 MS. O'DELL: He's not saying you</p> <p>14 can't --</p> <p>15 BY MR. PLACITELLA:</p> <p>16 Q I'm not asking you what was stated. All</p> <p>17 I'm asking you is --</p> <p>18 MS. O'DELL: At the last deposition we</p> <p>19 were at --</p> <p>20 BY MR. PLACITELLA:</p> <p>21 Q -- are you -- based -- having had a</p> <p>22 consult with your attorney, your attorneys, do you</p> <p>23 need to change your testimony in any way?</p> <p>24 MR. FROST: I'll renew my objection. I</p> <p>25 have not instructed my witness not to answer. But</p>	<p style="text-align: right;">Page 253</p> <p>1 marked for identification.)</p> <p>2 (Recess.)</p> <p>3 THE VIDEOGRAPHER: The time is 4:56 p.m.</p> <p>4 and we're back on the record.</p> <p>5 CROSS-EXAMINATION</p> <p>6 BY MR. FROST:</p> <p>7 Q Good afternoon, Dr. Wylie. Jack Frost</p> <p>8 from Biddle & Reath. As you know, I represent</p> <p>9 Johnson & Johnson in this case.</p> <p>10 I'm going to ask you a few questions</p> <p>11 this afternoon. They shouldn't take too long, and</p> <p>12 I apologize now, I'm going to be jumping around a</p> <p>13 bit.</p> <p>14 But do you recall this morning when you</p> <p>15 were asked a series of questions about testimony</p> <p>16 you gave to a United States Senate Committee about</p> <p>17 an asbestos ban bill?</p> <p>18 A I do.</p> <p>19 Q Can you explain to me in your own words</p> <p>20 what happened at that hearing?</p> <p>21 A I went to give testimony on the nature</p> <p>22 of asbestos. I went to urge the Committee to</p> <p>23 expand the definitions of regulated asbestos to</p> <p>24 include all asbestiform amphibole. I also</p> <p>25 requested that a methodology be developed so that</p>

<p style="text-align: right;">Page 254</p> <p>1 ordinary rock fragment would not be included. 2 And at the end of my testimony, I was 3 asked if I had ever worked for -- or I thought I 4 was asked if I had ever worked for asbestos 5 companies, and in the context of that hearing and 6 what was going on, I answered that question, "No." 7 The -- Senator Boxer then asked about 8 some invoices that she had and -- from 9 R.T. Vanderbilt. And so I said -- and she -- I 10 asked her to rephrase the question, because I -- I 11 thought perhaps I had answered a question that 12 wasn't exactly asked. She rephrased the question 13 somewhat and talked about had I ever given a 14 deposition, or something to that effect, in 15 litigation around allegations of asbestos-related 16 diseases or -- and of course, I had to answer in 17 the affirmative then. 18 And it was a very disturbing experience 19 for me because my integrity means a lot. And so 20 at the conclusion of that event, I wrote the 21 Senator a letter and detailing exactly what my 22 experience had been around the questions that she 23 asked, and just basically trying to explain my 24 misunderstanding and I had no intention to 25 deceive.</p>	<p style="text-align: right;">Page 256</p> <p>1 MR. PLACITELLA: Oh, it's -- I believe 2 her. I don't have to look at it. 3 MR. FROST: Okay. And again, the -- 4 MS. O'DELL: For my purposes, what is 5 the date on it so I can -- 6 THE WITNESS: June 16th, 2007. 7 BY MR. FROST: 8 Q And does this letter reflect what you 9 just talked about, the misunderstanding you had 10 about the questions being asked by doctor -- or, 11 sorry, by Senator Boxer? 12 A Yes. 13 Q And prior to today -- or I guess I'll 14 strike that. 15 This morning Mr. Placitella asked you a 16 series of questions about whether or not some 17 companies you had done consultation work for 18 manufactured asbestos-containing products; is that 19 correct? 20 A That's correct. 21 Q Prior to this morning, did you know that 22 any of those companies may have manufactured 23 asbestos-containing products? 24 A I did not. 25 Q And that was something that you learned</p>
<p style="text-align: right;">Page 255</p> <p>1 Q I'm going to mark as -- 2 MR. FROST: Sorry, what exhibit are we 3 on? 4 THE REPORTER: 54. 5 MR. FROST: AW-54. Pass this to the 6 court reporter. 7 (Wylie Exhibit No. AW-54 was 8 marked for identification.) 9 MR. FROST: This is for you. 10 THE WITNESS: Oh. 11 MS. O'DELL: Do you have a copy for us? 12 MR. FROST: I don't. I only have the 13 one. It was in the reliance materials we 14 forwarded. 15 MS. O'DELL: Okay. 16 MR. PLACITELLA: Okay. We waited for 17 half an hour. You don't have a copy for me? 18 MR. FROST: We do. I was going to say 19 we have the big one. 20 BY MR. FROST: 21 Q But is this a -- is this a copy of the 22 letter you were talking about, Dr. Wylie? 23 A Yes. 24 MR. FROST: I mean, I'm happy to give it 25 to you, Chris, to look at.</p>	<p style="text-align: right;">Page 257</p> <p>1 today? 2 A Yes. 3 Q This morning you were also asked various 4 questions about the methodologies you employed in 5 undertaking or in drafting your expert report. 6 Can you please explain to us what 7 methodology you employed in this case? 8 A I reviewed the literature. I -- what I 9 basically did was for review of the literature and 10 the reports, I considered myself as a reviewer of 11 a document like I would in an academic setting for 12 a journal. And that was my job, and that's what I 13 did. 14 Q And is what you did to draft your report 15 any different than what you would undertake in 16 this literature review as an academic? 17 A No. 18 Q And can you explain to us what steps you 19 took to conduct your literature review? 20 A I searched through GeoRef, which is a 21 database for geologic literature. I searched the 22 web, just putting in information and seeing what I 23 could find on the various mines, for example. I 24 think that's how I found the information on Mindat 25 for the Argonaut Mine. And of course, I reviewed</p>

<p style="text-align: right;">Page 258</p> <p>1 the two Pooley reports.</p> <p>2 Q If you were undertaking a scientific</p> <p>3 review as -- in your role as professor emeritus,</p> <p>4 is there anything different you would have done in</p> <p>5 undertaking that literature review than you did</p> <p>6 here?</p> <p>7 A No.</p> <p>8 Q Are there any additional sources you</p> <p>9 would have sought out to consider?</p> <p>10 A No.</p> <p>11 Q You were also asked a series of</p> <p>12 questions this morning about articles you relied</p> <p>13 on, and the question was always asked around, you</p> <p>14 know, the frame of other than articles in which</p> <p>15 you were an author.</p> <p>16 Do -- do you recall that series?</p> <p>17 A I do.</p> <p>18 MR. PLACITELLA: Objection to the form.</p> <p>19 BY MR. FROST:</p> <p>20 Q Is it acceptable in a scientific</p> <p>21 literature review to rely on peer-reviewed</p> <p>22 articles?</p> <p>23 MR. PLACITELLA: Objection to form.</p> <p>24 THE WITNESS: Yes.</p> <p>25 BY MR. FROST:</p>	<p style="text-align: right;">Page 260</p> <p>1 A If it's available, certainly.</p> <p>2 Q With respect to the various publications</p> <p>3 in your report in which you were an author, are</p> <p>4 those peer reviewed?</p> <p>5 A Yes.</p> <p>6 Q Is there any reason it would be</p> <p>7 unreliable to rely on your own peer-reviewed</p> <p>8 publications to support your opinions here?</p> <p>9 A I hope not.</p> <p>10 Q And again, would you agree with me that</p> <p>11 you've actually published a significant number of</p> <p>12 articles with respect to asbestos and the</p> <p>13 identification of asbestos. Is that correct?</p> <p>14 A That's correct.</p> <p>15 MR. PLACITELLA: Objection to form.</p> <p>16 BY MR. FROST:</p> <p>17 Q Can you estimate for me how many</p> <p>18 peer-reviewed articles you've published on this</p> <p>19 subject?</p> <p>20 A I think I put in my report that number</p> <p>21 38. I'm happy to recount.</p> <p>22 Q Do you know of any other scientists who</p> <p>23 has published more peer-reviewed papers --</p> <p>24 MR. PLACITELLA: In mine it's 39.</p> <p>25 BY MR. FROST:</p>
<p style="text-align: right;">Page 259</p> <p>1 Q And can you explain to me what a</p> <p>2 peer-reviewed -- like what it means to be a</p> <p>3 peer-reviewed publication?</p> <p>4 A It means that the manuscript that you</p> <p>5 submit to a journal is sent out, usually</p> <p>6 anonymously, to experts in the field. And their</p> <p>7 comments come back to the editor. The editor</p> <p>8 sometimes -- mostly will ask for responses.</p> <p>9 The -- sometimes the peer review requires another</p> <p>10 review. Sometimes it says simply address these</p> <p>11 issues. One addresses the issues, makes the</p> <p>12 revisions or argues that they're unnecessary. The</p> <p>13 editor makes the decision at that point about</p> <p>14 whether to accept an article or require that it go</p> <p>15 out for additional review.</p> <p>16 But in the long run, it really means</p> <p>17 that your work has been reviewed by other experts</p> <p>18 in the field anonymously -- normally anonymously.</p> <p>19 Q And is review of peer-reviewed</p> <p>20 scientific literature what an academic or a</p> <p>21 scientist typically does in undertaking a</p> <p>22 literature review?</p> <p>23 A Normally do you look for peer-reviewed</p> <p>24 information?</p> <p>25 Q Yes.</p>	<p style="text-align: right;">Page 261</p> <p>1 Q Are you aware of any other scientists</p> <p>2 who have published more peer-reviewed literature</p> <p>3 than you have in these areas?</p> <p>4 MR. PLACITELLA: Objection. I think</p> <p>5 that's beyond her competence, but okay.</p> <p>6 THE WITNESS: Yeah, I -- I would say</p> <p>7 certainly I'm among those who have published a</p> <p>8 lot. I couldn't tell you -- I don't -- I would</p> <p>9 have to see their CVs.</p> <p>10 BY MR. FROST:</p> <p>11 Q And in addition to your peer-reviewed</p> <p>12 publications on the identification of asbestos and</p> <p>13 asbestos, have you done any other work as a</p> <p>14 scientist in these areas?</p> <p>15 A I have done -- oh, yes, mm-hmm. I have</p> <p>16 done work that I have not published.</p> <p>17 Q And what types of things would this work</p> <p>18 have undertaken?</p> <p>19 MR. PLACITELLA: Object to the form.</p> <p>20 THE WITNESS: I've reviewed reports.</p> <p>21 I've analyzed materials as -- as we've discussed.</p> <p>22 I've done research in the lab. I've had students</p> <p>23 do the work on -- in the topic under my direction.</p> <p>24 BY MR. FROST:</p> <p>25 Q And you would agree with me that you're</p>

<p style="text-align: right;">Page 262</p> <p>1 bringing all of this prior experience and work 2 into the opinions you've drafted for this case, 3 correct? 4 A That's -- 5 MR. PLACITELLA: Objection. Leading. 6 THE WITNESS: That's correct. 7 BY MR. FROST: 8 Q I'm going to turn your attention to a 9 letter that was previously marked as AW-17. 10 A Yes. 11 Q If you could turn to page 3. 12 Do you recall Mr. Placitella asked you a 13 series of questions regarding this -- this 14 particular letter? 15 A I do. 16 Q And it appears in the last article that 17 you're taking issue with an EPA interim method on 18 testing of bulk insulation materials. Is that 19 fair? 20 A That's fair. 21 Q What year was this letter written? 22 A 1986. 23 Q And you've also talked extensively today 24 about the EPA PLM testing methodology; is that 25 correct?</p>	<p style="text-align: right;">Page 264</p> <p>1 MR. PLACITELLA: Has that been supplied 2 to us before? 3 MR. FROST: No. 4 MR. PLACITELLA: Well, I object to you 5 asking her any question about any document that 6 has not been supplied to us before the deposition 7 or in discovery and which I have no opportunity to 8 read and review. So I object to using this at 9 all, and I object to all questions relating to it. 10 MR. FROST: Well, that's fine, Chris. 11 This is in direct rebuttal to something you 12 brought up during your examination, and it's a 13 publicly available document. So your objection is 14 noted, but we're going to continue. 15 MR. PLACITELLA: Well -- okay. Well, I 16 sat around here for more than an hour, and you 17 apparently knew that you were going to use this. 18 It would have been nice and courteous if you had 19 handed it to me ahead of time. But do whatever 20 you will do. 21 MR. FROST: I will. 22 (Wylie Exhibit AW-55 was marked 23 for identification.) 24 MR. FROST: Is it marked? Please give 25 that to Dr. Wylie.</p>
<p style="text-align: right;">Page 263</p> <p>1 A That's correct. 2 Q And is that the R-93 method? 3 A Yes. 4 Q Are you aware what year the EPA 5 published R-93? 6 A 1993. 7 Q So that was certainly after the 1986 8 drafting of this letter, correct? 9 MR. PLACITELLA: Objection. Leading. 10 THE WITNESS: That's -- 11 BY MR. FROST: 12 Q I'll reask the question. Is 1993 after 13 1986 when you drafted this letter? 14 MR. PLACITELLA: Objection to the form. 15 THE WITNESS: Yes. 16 BY MR. FROST: 17 Q Do you know what interim method -- EPA 18 interim method you're talking about on page 3 of 19 this letter? 20 A Yes, there was a method, an interim 21 method that was published in the '80s. That's the 22 method I'm referring to. 23 MR. FROST: I'm going to mark this 24 document as AW-55. Hand that to the court 25 reporter.</p>	<p style="text-align: right;">Page 265</p> <p>1 BY MR. FROST: 2 Q Take your time to review what's been 3 marked as AW-55. 4 A Yes. 5 Q Is this the interim method from the EPA 6 that you were just talking about? 7 A Yes. 8 Q And is this the interim method that's 9 referenced in the letter designated as AW-16? 10 A Yes. 11 Q Could you point me to where in this 12 document you -- or strike that. 13 What aspect of this interim method is 14 your letter specifically addressing in the final 15 paragraph on page 3 of AW-16? 16 MR. PLACITELLA: Object to the form. 17 THE WITNESS: The section of the method, 18 1.7.2.4, "Quantitation of asbestos content." In 19 the second paragraph: "For the purpose of this 20 method, asbestos fibers," and that's in quotes, 21 "are defined as having an aspect ratio greater 22 than 3-to-1, and being positively identified as 23 one of the minerals in Table 1.1." 24 BY MR. FROST: 25 Q Did that portion of the interim method</p>

<p style="text-align: right;">Page 266</p> <p>1 make it into R-93?</p> <p>2 A It did not.</p> <p>3 Q And what was the reason that you're</p> <p>4 criticizing this particular portion of the interim</p> <p>5 method?</p> <p>6 A It's inadequate to discriminate asbestos</p> <p>7 from cleavage fragments.</p> <p>8 Q All right. Next I'm going to turn your</p> <p>9 attention to what has been previously marked as</p> <p>10 AW-16. I'll hand that to you.</p> <p>11 Do you recall when Mr. Placitella was</p> <p>12 asking you a series of questions about this</p> <p>13 letter?</p> <p>14 A Yes, I do.</p> <p>15 Q Okay. I'm going to make it real easy so</p> <p>16 the record is clear.</p> <p>17 Did you work with -- well, strike that.</p> <p>18 I'll go back first.</p> <p>19 You testified before, if I'm correct,</p> <p>20 that the work you were doing in and around 1987</p> <p>21 was the drafting of a methodology for PLM that you</p> <p>22 submitted to the ASTM committee. Is that fair?</p> <p>23 A That's fair.</p> <p>24 Q Okay. In drafting that methodology,</p> <p>25 and I'm going to make this really simple, did you</p>	<p style="text-align: right;">Page 268</p> <p>1 MR. FROST: I'm going to mark this as</p> <p>2 AW-56, please.</p> <p>3 (Wylie Exhibit No. AW-56 was</p> <p>4 marked for identification.)</p> <p>5 MR. PLACITELLA: I don't want to take it</p> <p>6 home. It's too heavy.</p> <p>7 How come you could make a big fat copy</p> <p>8 of that, but you couldn't give me a two-page piece</p> <p>9 of paper?</p> <p>10 BY MR. FROST:</p> <p>11 Q Turn your attention to page 36, please.</p> <p>12 A I'm going to have to move this clamp.</p> <p>13 Q That's fine. Take your time.</p> <p>14 A I'm going to take the clamp off. Okay.</p> <p>15 Q Okay. I'm going to read a portion of</p> <p>16 the deposition.</p> <p>17 Starting on page 36, line 8:</p> <p>18 "Q. In testing that you did on</p> <p>19 the two ore deposits and also baby</p> <p>20 powder products with talc in them,</p> <p>21 were you ever able to determine</p> <p>22 whether or not either the ore or</p> <p>23 any of the baby powder had</p> <p>24 asbestos in it?</p> <p>25 "A. Well, we were -- part of a</p>
<p style="text-align: right;">Page 267</p> <p>1 ever work with or have any communications with</p> <p>2 W. Ashton?</p> <p>3 A He wrote me this letter.</p> <p>4 Q Other than this letter, did you ever</p> <p>5 work with W. Ashton on that methodology?</p> <p>6 A No.</p> <p>7 Q Okay. And we know you've done other</p> <p>8 work with Slim Thompson, but did you do any work</p> <p>9 with Slim Thompson regarding the drafting of this</p> <p>10 methodology?</p> <p>11 A No.</p> <p>12 Q Okay. And in fact, who did you submit</p> <p>13 the methodology to?</p> <p>14 A The committee, ASTM Committee D22507.</p> <p>15 Actually, I probably sent it to Sharon</p> <p>16 Kaufman at ASTM.</p> <p>17 Q Do you recall before being showed a</p> <p>18 portion of a deposition transcript from</p> <p>19 Dr. Pooley?</p> <p>20 A I do.</p> <p>21 Q And you'd agree with me that that was</p> <p>22 not the complete deposition transcript you were</p> <p>23 shown, correct?</p> <p>24 A Yes, I am.</p> <p>25 MR. PLACITELLA: So -- so stipulated.</p>	<p style="text-align: right;">Page 269</p> <p>1 visit like to take the samples is</p> <p>2 to look around and see if you can</p> <p>3 see anything which might represent</p> <p>4 an asbestos-type contaminant. And</p> <p>5 although looking at the rock</p> <p>6 specimens we brought back, there</p> <p>7 were amphibole minerals, but there</p> <p>8 were no obvious asbestos visible</p> <p>9 in the mine.</p> <p>10 "Q. After all the testing that</p> <p>11 you did, were you able ever to</p> <p>12 find asbestos in the samples or</p> <p>13 the deposit samples that you</p> <p>14 looked at?"</p> <p>15 MR. PLACITELLA: Well, can you just put</p> <p>16 for the record who's asking these questions?</p> <p>17 MR. FROST: Sure.</p> <p>18 MR. PLACITELLA: Is it the lawyer for</p> <p>19 Johnson & Johnson?</p> <p>20 MR. FROST: Yes.</p> <p>21 MR. PLACITELLA: So -- so this is prior</p> <p>22 to Mr. Lanier's cross, just for context.</p> <p>23 MR. FROST: I believe that's correct.</p> <p>24 This is Mr. Bicks.</p> <p>25 MR. PLACITELLA: Okay. Okay.</p>

<p style="text-align: right;">Page 270</p> <p>1 BY MR. FROST:</p> <p>2 Q So before we were interrupted,</p> <p>3 continuing along --</p> <p>4 MR. PLACITELLA: I just --</p> <p>5 BY MR. FROST:</p> <p>6 Q -- on page 37 --</p> <p>7 MR. FROST: That's fine.</p> <p>8 MR. PLACITELLA: I want to make sure the</p> <p>9 record is clear.</p> <p>10 BY MR. FROST:</p> <p>11 Q "A. No. Mineral types, yeah, amphibole</p> <p>12 mineral, but no asbestos, no."</p> <p>13 Did I read that correctly?</p> <p>14 A That's -- that's what it says.</p> <p>15 Q Based on what you read here, is this</p> <p>16 consistent with what you saw in Dr. Pooley's</p> <p>17 report?</p> <p>18 A It is.</p> <p>19 Q Now, finally, you were asked a series of</p> <p>20 questions about PLM; is that correct?</p> <p>21 A Yes.</p> <p>22 Q Is PLM an instrument or a methodology?</p> <p>23 A An instrument.</p> <p>24 Q Do you take any issue with the fact that</p> <p>25 Drs. Longo and Rigler used PLM as an instrument in</p>	<p style="text-align: right;">Page 272</p> <p>1 correct?</p> <p>2 A Yes.</p> <p>3 MR. FROST: Thank you. That's all the</p> <p>4 questions that we have.</p> <p>5 MR. PLACITELLA: Okay. I just have five</p> <p>6 minutes or less.</p> <p>7 MR. FROST: Well, hold on, how much time</p> <p>8 did we use?</p> <p>9 THE VIDEOGRAPHER: That session was 19</p> <p>10 minutes.</p> <p>11 MR. PLACITELLA: Okay. So I'm good,</p> <p>12 right?</p> <p>13 MR. FROST: So 19 minutes are left.</p> <p>14 MR. PLACITELLA: Okay. Well, I will do</p> <p>15 it in five minutes or less.</p> <p>16 REDIRECT EXAMINATION</p> <p>17 BY MR. PLACITELLA:</p> <p>18 Q As a scientist, a conscientious</p> <p>19 scientist -- and by the way, this thing with the</p> <p>20 Senate testimony, I appreciate your testimony.</p> <p>21 After that happened, did you go back and look at</p> <p>22 your old CDs and figure out who you worked for to</p> <p>23 see -- before you wrote the letter to -- to</p> <p>24 Senator Boxer to say, Hey, did GAF ever make</p> <p>25 asbestos? Did Keene ever make asbestos? Did you</p>
<p style="text-align: right;">Page 271</p> <p>1 their testing?</p> <p>2 A No.</p> <p>3 Q Is there anything that you take issue</p> <p>4 with?</p> <p>5 MR. PLACITELLA: Objection to the form.</p> <p>6 BY MR. FROST:</p> <p>7 Q That wasn't quite done, but is there</p> <p>8 anything you take issue with with respect to the</p> <p>9 use of PLM in the -- in Dr. Longo and Rigler's</p> <p>10 testing?</p> <p>11 A I -- I believe I've made those comments</p> <p>12 in my testimony.</p> <p>13 Q Other than what you've testified to</p> <p>14 today, you know, thus far today, is there anything</p> <p>15 with respect to the methodology utilized by them</p> <p>16 under PLM that you take issue with?</p> <p>17 MR. PLACITELLA: Objection to the form.</p> <p>18 THE WITNESS: Yes. I think I outlined</p> <p>19 that.</p> <p>20 BY MR. FROST:</p> <p>21 Q And where do you outline that?</p> <p>22 A In -- in my report.</p> <p>23 Q Okay. So your criticisms with the</p> <p>24 methodology utilized by Drs. Longo and Rigler</p> <p>25 under PLM are set forth in your report; is that</p>	<p style="text-align: right;">Page 273</p> <p>1 ever do that?</p> <p>2 A Her question was quite specific with</p> <p>3 respect to litigation and disease.</p> <p>4 Q Okay. We'll just leave it there.</p> <p>5 As a conscientious scientist, do you --</p> <p>6 but before you come to reach your conclusions, do</p> <p>7 you like to have all the available information or</p> <p>8 just partial, part of the information?</p> <p>9 MR. FROST: Objection to form.</p> <p>10 THE WITNESS: All the information -- I</p> <p>11 guess I'm not clear exactly. If you're referring</p> <p>12 to all of those testings that you showed me, I was</p> <p>13 asked to review this document as I would a peer</p> <p>14 review of a publication, and that was what I did.</p> <p>15 BY MR. PLACITELLA:</p> <p>16 Q Yeah, and I appreciate that, Doctor.</p> <p>17 But what happened in this case is your lawyers</p> <p>18 cherry-picked non-published information and gave</p> <p>19 it to you to review but didn't provide you other</p> <p>20 information. Correct?</p> <p>21 MR. FROST: Objection to form.</p> <p>22 BY MR. PLACITELLA:</p> <p>23 Q That's what happened.</p> <p>24 MR. FROST: Objection to form.</p> <p>25 THE WITNESS: There certainly is a lot</p>

<p style="text-align: right;">Page 274</p> <p>1 of information that you showed me.</p> <p>2 BY MR. PLACITELLA:</p> <p>3 Q Okay. And to be complete in your</p> <p>4 analysis, you would at least like to know what it</p> <p>5 is and decide whether to discard it or consider</p> <p>6 it. Do you agree?</p> <p>7 MR. FROST: Objection to form.</p> <p>8 THE WITNESS: Information by itself</p> <p>9 doesn't have a lot of meaning. The context, who</p> <p>10 did it, the reputation of the person, the skills</p> <p>11 of the person, and that sort of thing, and so some</p> <p>12 of those documents you showed me were practically</p> <p>13 before I was a professor. I don't know if they</p> <p>14 would have been helpful to me or not because that</p> <p>15 information might not have been there. I don't</p> <p>16 know.</p> <p>17 BY MR. PLACITELLA:</p> <p>18 Q Well, the Colorado School of Mines,</p> <p>19 that's a respected entity, is it not, testing</p> <p>20 entity?</p> <p>21 MR. FROST: Objection to form.</p> <p>22 THE WITNESS: Yes, so is the University</p> <p>23 of Maryland, yes.</p> <p>24 BY MR. PLACITELLA:</p> <p>25 Q No question.</p>	<p style="text-align: right;">Page 276</p> <p>1 A Yes.</p> <p>2 Q -- Frost just --</p> <p>3 A Yes.</p> <p>4 Q Other than that, it -- it's fine?</p> <p>5 A I haven't looked at the -- no, I</p> <p>6 wouldn't say that. I'm not going to bless it</p> <p>7 because I'd have to look at it very carefully.</p> <p>8 Q Okay. So --</p> <p>9 A But in the letter that I wrote which you</p> <p>10 asked me about, I was referring specifically to</p> <p>11 the aspect ratio and the particle criteria that</p> <p>12 they put for a definition of "asbestos fiber."</p> <p>13 Q Okay.</p> <p>14 A That was my objection reflected in that</p> <p>15 letter.</p> <p>16 Q So you had no problem with the fact that</p> <p>17 they were using a spec for bulk insulation</p> <p>18 samples, correct?</p> <p>19 MR. FROST: Objection to form.</p> <p>20 BY MR. PLACITELLA:</p> <p>21 Q Didn't express that.</p> <p>22 MR. FROST: Objection to form.</p> <p>23 THE WITNESS: Please -- please -- please</p> <p>24 ask it again.</p> <p>25 BY MR. PLACITELLA:</p>
<p style="text-align: right;">Page 275</p> <p>1 A Yes.</p> <p>2 Q And can we just put it on the record so</p> <p>3 when I go home and I talk to my Terrapin son</p> <p>4 graduate that I'm not taking away from the</p> <p>5 University of Maryland.</p> <p>6 But Colorado School of Mines clearly is</p> <p>7 a respected entity for testing, correct?</p> <p>8 MR. FROST: Objection to form.</p> <p>9 THE WITNESS: Yes.</p> <p>10 BY MR. PLACITELLA:</p> <p>11 Q And you were provided nothing from them,</p> <p>12 correct?</p> <p>13 A Yes.</p> <p>14 Q And clearly McCrone is an -- a respected</p> <p>15 entity for testing, correct?</p> <p>16 MR. FROST: Objection to form.</p> <p>17 THE WITNESS: As with all testing</p> <p>18 laboratories, they make mistakes.</p> <p>19 BY MR. PLACITELLA:</p> <p>20 Q Everybody makes mistakes. Do you agree?</p> <p>21 A So, yes, of course.</p> <p>22 Q Okay. And this test method -- this EPA</p> <p>23 test method where you said that what ended up --</p> <p>24 or what you had an issue with was the 3-to-1</p> <p>25 aspect ratio, do you recall that? Mr. --</p>	<p style="text-align: right;">Page 277</p> <p>1 Q This --</p> <p>2 A Yes.</p> <p>3 Q -- was for bulk insulation.</p> <p>4 A That's correct.</p> <p>5 Q But your problem wasn't that it was for</p> <p>6 bulk insulation. It was because they had the</p> <p>7 wrong aspect ratio, correct?</p> <p>8 MR. FROST: Objection to form.</p> <p>9 THE WITNESS: My problem was is that</p> <p>10 because it -- yes. I would say yes.</p> <p>11 BY MR. PLACITELLA:</p> <p>12 Q Okay. Now, just so we know, is there</p> <p>13 tremolite in the Vermont mines that were used for</p> <p>14 baby powder?</p> <p>15 MR. FROST: Objection to form.</p> <p>16 THE WITNESS: Yes.</p> <p>17 BY MR. PLACITELLA:</p> <p>18 Q There is?</p> <p>19 A Yes.</p> <p>20 Q How much?</p> <p>21 A I don't know.</p> <p>22 Q Okay. And the only way you would know</p> <p>23 is if somebody gave you a sample, correct? And</p> <p>24 you test -- you tested or had it tested, correct?</p> <p>25 MR. FROST: Objection to form.</p>

<p style="text-align: right;">Page 278</p> <p>1 BY MR. PLACITELLA:</p> <p>2 Q That's how you would be certain.</p> <p>3 A I would be certain.</p> <p>4 Q Right. And that -- and you would take</p> <p>5 that sample and you would put it under the PLM</p> <p>6 microscope, correct?</p> <p>7 A Correct.</p> <p>8 Q And you would take photomicrographs,</p> <p>9 correct?</p> <p>10 A Usually.</p> <p>11 Q Right. And then based upon that, you</p> <p>12 would make the determination about whether that</p> <p>13 tremolite was asbestos or not, correct?</p> <p>14 MR. FROST: Objection to form.</p> <p>15 THE WITNESS: Yes.</p> <p>16 BY MR. PLACITELLA:</p> <p>17 Q But that didn't happen in this case,</p> <p>18 correct?</p> <p>19 MR. FROST: Objection to form.</p> <p>20 THE WITNESS: I analyzed no samples.</p> <p>21 BY MR. PLACITELLA:</p> <p>22 Q That didn't happen in this case.</p> <p>23 A It did not happen.</p> <p>24 MR. FROST: Objection to form.</p> <p>25 BY MR. PLACITELLA:</p>	<p style="text-align: right;">Page 280</p> <p>1 conclusions.</p> <p>2 MR. FROST: Same set of objections.</p> <p>3 BY MR. PLACITELLA:</p> <p>4 Q Correct?</p> <p>5 A I think that's what I just said.</p> <p>6 Q Okay. And if the tests output from the</p> <p>7 microscope aren't available to you, they're no</p> <p>8 longer available, they're destroyed, that would</p> <p>9 impact the scientific process of evaluating</p> <p>10 whether there was asbestos or not in that sample,</p> <p>11 correct?</p> <p>12 MR. FROST: Hold on. Objection to form.</p> <p>13 First off, this is outside of the direct</p> <p>14 examination. You've gone far afield of anything</p> <p>15 that we asked. If you wanted to ask these</p> <p>16 questions, Chris, you should have asked them</p> <p>17 during your direct examination.</p> <p>18 MR. PLACITELLA: I'm almost done.</p> <p>19 MR. FROST: Hold on. I'm not done yet.</p> <p>20 And second off, now you're asking</p> <p>21 questions that have absolutely nothing to do with</p> <p>22 any of the opinions that Dr. Wylie has rendered in</p> <p>23 this case.</p> <p>24 MR. PLACITELLA: Well, somebody else</p> <p>25 will make that determination.</p>
<p style="text-align: right;">Page 279</p> <p>1 Q And just a couple more questions, and</p> <p>2 I -- I might be going over by one minute.</p> <p>3 In order to determine whether a test was</p> <p>4 valid or not, right, let's say PLM, you would</p> <p>5 actually need either -- you would actually need</p> <p>6 the sample itself and run your own test or the</p> <p>7 output from the microscope, correct?</p> <p>8 MR. FROST: Hold on. First, objection</p> <p>9 to form. Second, objection goes well beyond the</p> <p>10 examination.</p> <p>11 BY MR. PLACITELLA:</p> <p>12 Q Correct?</p> <p>13 In other words, if you had to verify a</p> <p>14 test that was made, right, you would either have</p> <p>15 to look at the output from a microscope that you</p> <p>16 trusted, true?</p> <p>17 A Look at it with --</p> <p>18 MR. FROST: Same objections.</p> <p>19 THE WITNESS: Look at it with a</p> <p>20 microscope myself?</p> <p>21 BY MR. PLACITELLA:</p> <p>22 Q Yes.</p> <p>23 A Yes, mm-hmm.</p> <p>24 Q Or you would have to take that sample</p> <p>25 and run the test yourself and draw your own</p>	<p style="text-align: right;">Page 281</p> <p>1 BY MR. PLACITELLA:</p> <p>2 Q So all I'm asking you is, if you wanted</p> <p>3 to verify testing that was done by somebody else,</p> <p>4 you would need to see the actual output from the</p> <p>5 microscope that they were looking at in a clear</p> <p>6 and presentable form. Is that fair?</p> <p>7 MR. FROST: Same set of objections.</p> <p>8 THE WITNESS: I would need a list of the</p> <p>9 properties that they measured and the data that</p> <p>10 they -- and the results of those properties. I'd</p> <p>11 like to know if they're calling it tremolite.</p> <p>12 What is the principal index of refraction, what is</p> <p>13 the extinction angle, where is the optic plane,</p> <p>14 and all of those listing things that I gave you.</p> <p>15 BY MR. PLACITELLA:</p> <p>16 Q Right.</p> <p>17 A Those could be listed. They could be</p> <p>18 listed. I would not necessarily -- if I had all</p> <p>19 of that information, I think I would be able to</p> <p>20 conclude whether they had valid assumptions or</p> <p>21 valid conclusions.</p> <p>22 Q Right. I'm not quarreling with you.</p> <p>23 A I don't need the output from the</p> <p>24 microscope --</p> <p>25 Q Okay.</p>

<p style="text-align: right;">Page 282</p> <p>1 A -- in the sense I don't need 2 necessarily -- I mean, I don't know what you're 3 really referring to with output -- 4 Q Were the photomicrographs -- 5 A Well, that doesn't give you -- 6 MR. FROST: Objection to form. 7 THE WITNESS: -- the optical properties. 8 BY MR. PLACITELLA: 9 Q Okay. What does give you the optical 10 properties? 11 MR. FROST: Objection. 12 THE WITNESS: You have to measure -- 13 BY MR. PLACITELLA: 14 Q No, what output gives you the optical 15 properties that you could look at to verify? 16 MR. FROST: Objection. 17 THE WITNESS: I would need a table 18 indicating that they had measured them and what 19 they had found. 20 BY MR. PLACITELLA: 21 Q Okay. And without that information, 22 you -- you couldn't really verify one way or the 23 other? 24 MR. FROST: Same set of objections. 25 BY MR. PLACITELLA:</p>	<p style="text-align: right;">Page 284</p> <p>1 Q Okay. Okay. What was my question? 2 A I think you asked me if I had to have 3 the output from the microscope, and I was not 4 clear what that is. 5 Q Okay. 6 A These are observations that are made and 7 measurements that were -- 8 Q I was probably inartful. 9 There would be results that you would 10 like to look at in order to verify whether in your 11 opinion you agreed with somebody else's 12 conclusions, correct? 13 MR. FROST: Same objections. 14 THE WITNESS: Yes. And they were not 15 available in the Longo and Rigler report. 16 BY MR. PLACITELLA: 17 Q And they weren't available for any of 18 the other tests that Johnson & Johnson did, 19 correct? 20 MR. FROST: Same objection. You're 21 asking her to speculate now. 22 THE WITNESS: I haven't seen them. 23 BY MR. PLACITELLA: 24 Q Would you liked to have seen them? 25 MR. FROST: Objection.</p>
<p style="text-align: right;">Page 283</p> <p>1 Q That's all I'm asking. 2 A That's right. 3 Q Right. 4 So if Johnson & Johnson was doing 5 testing historically, the only way that you could 6 verify the validity of those tests is to have the 7 kind of information that you are referring to 8 today, correct? 9 MR. FROST: Objection to form. And 10 again, I think these questions are becoming more 11 and more inappropriate as you're going, Chris. 12 THE WITNESS: Yeah, I have to think a 13 little bit about your answer, because when -- when 14 you apply the EPA method, and they tell you that 15 they have seen that meth- -- that information, 16 and, yes, they verified that they found fiber 17 bundles, and that sort of thing -- you're -- 18 you're talking about a legal setting. I operate 19 in a scientific setting. So I think they're 20 really quite different. 21 And what I would accept from a 22 scientist's word who I knew was well trained might 23 be different from what you would accept as a 24 lawyer. 25 BY MR. PLACITELLA:</p>	<p style="text-align: right;">Page 285</p> <p>1 BY MR. PLACITELLA: 2 Q No? 3 A No. 4 Q So if Johnson & Johnson did their own 5 tests on their own samples, that wouldn't have 6 been important to you in terms of your opinions in 7 this case? 8 MR. FROST: Objection. Asked and 9 answered several times. 10 THE WITNESS: I was asked to act as a 11 reviewer. I was not -- a reviewer of very 12 specific things, and that's what I did. 13 BY MR. PLACITELLA: 14 Q Okay. But there's no question, as we 15 end this deposition, that there was tremolite in 16 the Vermont mines used for baby powder, correct? 17 MR. FROST: Objection to form. 18 THE WITNESS: Correct. 19 MR. PLACITELLA: Okay. No more 20 questions. Thank you. 21 MR. FROST: I just have one question, 22 follow up to that. 23 RECROSS-EXAMINATION 24 BY MR. FROST: 25 Q When you're -- when you say "tremolite,"</p>

<p style="text-align: right;">Page 286</p> <p>1 Dr. Wylie, you're talking about tremolite, the 2 mineral, which is different than asbestiform 3 tremolite, right? 4 MR. PLACITELLA: Objection. Leading, 5 form. You can't do that. 6 MR. FROST: Well, I don't know that you 7 have -- 8 MR. PLACITELLA: You can't do that. 9 MR. FROST: -- much of a right to object 10 here, but fine. 11 BY MR. FROST: 12 Q What did you mean by object -- or what 13 do you mean by tremolite, Dr. Wylie, in 14 response -- 15 MR. PLACITELLA: Object -- 16 BY MR. FROST: 17 Q -- to Mr. Placitella's question? 18 MR. PLACITELLA: Objection. 19 THE WITNESS: In my report I clearly 20 stated that a mineral name is applied to a 21 chemical composition and an ordered atomic 22 arrangement, and the external morphology or its 23 habit is unrelated entirely to the mineral name. 24 BY MR. FROST: 25 Q So just because Mr. Placitella was</p>	<p style="text-align: right;">Page 288</p> <p>1 CERTIFICATE OF CERTIFIED SHORTHAND REPORTER 2 The undersigned Certified Shorthand Reporter 3 does hereby certify: 4 That the foregoing proceeding was taken before 5 me at the time and place therein set forth, at 6 which time the witness was duly sworn; That the 7 testimony of the witness and all objections made 8 at the time of the examination were recorded 9 stenographically by me and were thereafter 10 transcribed, said transcript being a true and 11 correct copy of my shorthand notes thereof; That 12 the dismantling of the original transcript will 13 void the reporter's certificate. 14 In witness thereof, I have subscribed my name 15 this date: March 15, 2019. 16 17 _____ 18 LESLIE A. TODD, CSR, RPR 19 Certificate No. 5129 20 (The foregoing certification of 21 this transcript does not apply to any 22 reproduction of the same by any means, 23 unless under the direct control and/or 24 supervision of the certifying reporter.) 25</p>
<p style="text-align: right;">Page 287</p> <p>1 asking you about tremolite, that doesn't mean that 2 you believe there's asbestiform tremolite in those 3 mines, correct? 4 MR. PLACITELLA: Objection. Leading, 5 form. 6 THE WITNESS: No. 7 MR. FROST: Okay. That's all the 8 questions we have. 9 REDIRECT EXAMINATION 10 BY MR. PLACITELLA: 11 Q You'd have to see all the testing, 12 wouldn't you, to make a final conclusion? 13 MR. FROST: Objection to form. 14 THE WITNESS: No. 15 MR. PLACITELLA: Okay. That's all the 16 questions I have. Thank you. 17 THE VIDEOGRAPHER: All right. The time 18 is 5:29 p.m., on March 13th, 2019. We're going 19 off the record, completing the videotaped 20 deposition. 21 (Whereupon, the deposition of 22 ANN G. WYLIE, Ph.D. was 23 concluded at 5:29 p.m.) 24 25</p>	<p style="text-align: right;">Page 289</p> <p>1 INSTRUCTIONS TO WITNESS 2 Please read your deposition over carefully and 3 make any necessary corrections. You should state 4 the reason in the appropriate space on the errata 5 sheet for any corrections that are made. 6 After doing so, please sign the errata sheet 7 and date it. 8 You are signing same subject to the changes 9 you have noted on the errata sheet, which will be 10 attached to your deposition. It is imperative 11 that you return the original errata sheet to the 12 deposing attorney within thirty (30) days of 13 receipt of the deposition transcript by you. If 14 you fail to do so, the deposition transcript may 15 be deemed to be accurate and may be used in court. 16 17 18 19 20 21 22 23 24 25</p>

Ann G. Wylie, Ph.D.

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1 ACKNOWLEDGMENT OF DEPONENT

2 I, _____, do hereby

3 certify that I have read the foregoing pages, and

4 that the same is a correct transcription of the

5 answers given by me to the questions therein

6 propounded, except for the corrections or changes

7 in form or substance, if any, noted in the

8 attached Errata Sheet.

9

10 _____

11 ANN G. WYLIE, Ph.D. DATE

12

13

14 Subscribed and sworn to

15 before me this

16 _____ day of _____, 20____.

17 My commission expires: _____

18 _____

19 Notary Public

20

21

22

23

24

25

Exhibit C

VITAE

William Edward Longo, Ph.D
MAS, LLC
3945 Lakefield Court
Suwanee, Georgia 30024
Work Telephone: (770) 866-3200

EDUCATION

October 1980 to December 1983	Received Doctor of Philosophy in Materials Science and Engineering, University of Florida
June 1979 to May 1982	Received Master of Science in Materials Science and Engineering, University of Florida.
September 1972 to June 1977	Received Bachelor of Science degree; Major in Microbiology, Minor in Chemistry, University of Florida.

PROFESSIONAL WORK HISTORY

September 1987 to Present	President of MAS, LLC (previously Materials Analytical Services, Inc.) Suwanee, Georgia.
August 1987 to February 1988	President and Founder of Longo Microanalytical Services, Inc., Gainesville, Florida.
October 1983 to August 1987	President and Founder of Micro Analytical Laboratories, Inc., Gainesville, Florida.
March 1985 to December 1987	Visiting Assistant Professor; University of Florida, Department of Materials Science and Engineering.
August 1983 to March 1985	Post Doctoral Associate; University of Florida, Department of Materials Science and Engineering.

William E. Longo, Ph.D
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ACTIVITIES AND ORGANIZATIONS

- * Member of Environmental Protection Agency Workshop on Sampling and Analysis of Asbestos in Settled Dusts, July 1989.
- * Member of Environmental Protection Agency Peer Review Group for the Asbestos Engineering Program, 1987 to present.
- * Vice-Chairman of the National Asbestos Council Analytical Subcommittee on Transmission Electron Microscopy 1987-1988.
- * Chairman of National Asbestos Council Analytical Subcommittee on Transmission Electron Microscopy 1988-1989.
- * Member of ASTM D-22-05 Subcommittee for Indoor Air Pollution.

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LECTURES AND COURSES INSTRUCTED

Longo, W.E. "Electron Microscopy for Industrial Hygiene Applications" American Industrial Hygiene Conference Professional Development Course, Atlanta GA, May 2004.

Longo, W. E. "Settled Dust: Asbestos and Other Particulates" Georgia Institute of Technology Seminar, August 1991.

Longo, W. E. "The Role of the Laboratory Manager, Quality Assurance Officer and the Analyst for NIST Accreditation" Georgia Institute of Technology, Transmission Electron Microscopy Asbestos Accreditation Seminar, August 1989.

Longo, W. E. 24th Annual Meeting of the Microbeam Analysis Society, "Asbestos Analysis Session" Ashville, North Carolina, July 1989 (Session Co-Chairman).

Longo, W. E. "Fundamentals of Asbestos Analysis by TEM" Institute in Materials Science State University of New York. New Paltz, New York, October 1988 (Course Director).

Longo, W. E. "TEM Imaging/Photography" Georgia Institute of Technology, Transmission Electron Microscopy Asbestos Analysis Course, June 1988.

Longo, W. E. "Laboratory Preparation of Polycarbonate Filters for TEM Analysis" Georgia Institute of Technology, Advanced Transmission Electron Microscopy Asbestos Analysis Course, February 1988.

Longo, W. E. "Transmission Electron Microscopy Laboratory Set-Up" Georgia Institute of Technology, Advanced Transmission Electron Microscopy Asbestos Analysis Course, February 1988.

Longo, W. E. "Laboratory Analysis of Asbestos" Hall-Kimbrell Seminar in Asbestos Abatement in the State of Florida, January 1988.

Longo, W. E. "Air Sample Preparation and Analysis by TEM" Georgia Institute of Technology, Clearance Testing for Asbestos: AHERA Regulations, October 1987.

Longo, W. E. "Asbestos Air Sample Analysis by Transmission Electron Microscopy" American Industrial Hygiene Conference Professional Development Course, Montreal, Canada, May 1987.

Longo, W.E. "Asbestos Air Sample Analysis by Transmission Electron Microscopy" American Industrial Hygiene Conference Professional Development Course, Dallas, TX May 1986.

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PROFESSIONAL MEMBERSHIPS

American Industrial Hygiene Association	1985 to Present
American Society for the Testing of Materials	1987 to Present
American Society of Materials	1994 to Present
National Asbestos Council	1984 to 1993
Environmental Information Association	1993 to Present
Materials Research Society	1988 to Present
Electron Microscopy Society Association	1988 to Present
Microbeam Analysis Society	1988 to Present
New York Academy of Science	1985 to 1987 1989 to 1994
Air Pollution Control Association	1985 to 1987
National Institute of Building Sciences	1991 to Present
The Society for Ultrastructural Pathology	1996 to Present
American Society of Heating, Refrigerating and Air-Conditioning Engineers	1996 to Present
The American College of Forensic Examiners – Fellow of Forensic Engineering Technology (IN. 17825)	1999 to Present
American Conference of Governmental Industrial Hygienist (ACGIH) Associate Member	2006 to Present

Updated: 11/22/17

Exhibit D



STATE OF GEORGIA

COUNTY OF FORSYTH

AFFIDAVIT OF WILLIAM E. LONGO

Before me the undersigned notary, on this day personally appeared Dr. William E. Longo, a person who is known to me. After I administered an oath to him, upon his oath he said:

1. My name is William Longo; I am capable of making this affidavit. The facts stated in this affidavit are within my personal knowledge and are true and correct.
2. I have a Bachelor of Science degree in Microbiology, a Master of Science degree in Engineering and a Doctorate in Philosophy in Materials Science, from the University of Florida.
3. I am currently employed at Materials Analytical Services (MAS), LLC as the President. For the last 20 years, I have studied the content, type, and release of asbestos fibers from asbestos-containing products. MAS is accredited by the American Industrial Hygiene Association for measurement of asbestos fibers by phase contrast microscopy and for the analysis of bulk samples of asbestos. MAS is also certified by the National Volunteer Laboratory Accreditation Program for measurement of bulk samples and air samples of asbestos.
4. As a materials scientist, I study the relationships among structure, properties, synthesis, and performance of a wide range of materials. I examine why and how materials behave under various conditions, such as temperature, pressure, stress or exposure to climatic conditions, and how materials are used in every aspect of people's lives.
5. I have spent the last 23 years studying all aspects of asbestos analysis including the use of air samples to analyze the airborne asbestos dust generated from the use of asbestos-containing products. This would include the use of both midget impinger and air cassettes. Under my direction our laboratory has analyzed over 300,000 asbestos samples that included many thousands of air samples.
6. In addition to the routine analysis of air samples for asbestos content, again under my direction MAS has performed well over a hundred work



practice simulations that involve the measurement of airborne asbestos fibers from the use of these products using scientifically recognized methodologies. These work practice studies have been performed for both plaintiffs and defendants and these defendants include GE, Guard-Line, Carborundum, American Insulating Wire Corporation, Tecumseh engines and Vickers hydraulic pumps.

7. I have been qualified many times in court as an industrial hygienist in matters relating to asbestos issues and I currently supervise three certified industrial hygienists (Mike Mount, John Templin & George Pineda) that work for MAS.
8. At MAS, I analyze and study a wide spectrum of products and associated chemicals, including studies of various asbestos-containing products that test the potential for release of asbestos fibers into the air. These studies demonstrate, among other things, whether a product manufacturer could have anticipated the quantity of asbestos released into the air from its products as well as the levels of asbestos fibers released under certain circumstances. I perform these tests under rigorously controlled laboratory conditions following the governmental standards promulgated by NIOSH and the EPA. Using a testing room, I simulate the typical uses of asbestos-containing products including asbestos-containing cable hole covers, asbestos cement pipe and resin based asbestos products. MAS utilizes multiple, standardized analytical testing techniques to determine the amount of asbestos released into the air and dispersed into workers' breathing zones, their clothing, and bystander exposures. MAS methods include the very testing techniques routinely employed by and available to the asbestos industry in the 1950's and 1960's as well as updated, standardized testing procedures.
9. I am a member of numerous organizations and professional groups specializing in the testing and analysis of asbestos-containing materials, including the former Environmental Protection Agency (EPA) Peer Review Group for the Asbestos Engineering Program, the American Industrial Hygiene Association (AIHA), Materials Research Society, American Society for the Testing of Materials (ASTM), and the American Society of Materials. I have given numerous lectures, including "Settled Dust: Asbestos and Other Particulates," "The Role of the Laboratory Manager, Quality Assurance Officer and the Analyst for NIST Accreditation," and "Fundamentals of Asbestos Analysis by TEM."



10. Additionally, I was requested by the EPA, along with other scientists, to help develop the EPA's protocol for taking and analyzing settled asbestos dust samples. As a member of ASTM, I was also responsible for writing the ASTM asbestos dust analysis standards.
11. I have published numerous articles on the subject of the analysis and testing of asbestos-containing materials, including the quantification of asbestos particles released upon manipulation of these asbestos products in the manner performed in the work environment. My articles include Demonstration of the Capability of Asbestos Analysis by Transmission Electron Microscopy in the 1960's in *Microscope*, Asbestos Exposure During and Following Cable Installation in the Vicinity of Fireproofing in *Environmental Choices Technical Supplement* Fiber Release During the Removal of Asbestos-Containing Gaskets: A Work Practice Simulation, published in the *Applied Occupational and Environmental Hygiene Journal* in 2002 and Zonolite Attic Insulation Exposure Studies, in the *International Journal of Occupational Environmental Health* published in 2010.
12. My consulting extends beyond testimony for plaintiffs in asbestos cases. MAS consults with defense firms and outside the litigation context with well-known companies such as Hitachi, Intel, BMW, Honda, Dow, and others. MAS is a leading engineering consulting firm which provides a broad range of services including environmental and industrial hygiene and emissions testing of construction products.
13. MAS has employees with expert knowledge in a broad range of fields including material sciences, chemistry, physics, biology, microbiology industrial hygiene, geology, and microscopy. MAS has performed consulting work for government agencies such as the Centers for Disease Control and the National Institutes of Health. MAS has also worked as an expert for the City of New York and the State of New York in their respective litigation against asbestos companies for property damage litigation. MAS has been involved in testing asbestos-containing materials for over twenty years, and has analyzed hundreds of thousands of asbestos samples.
14. I regularly perform work for clients not involved in litigation and utilize the same generally accepted methodologies and analysis described above. MAS's studies and videotape demonstrations are used for educational and



training purposes in conjunction with the American Industrial Hygiene Association, American Society of Safety Engineers, the Environmental Institute, AHERA certification training and the U.S. Public Health Service.

15. Only about 30 to 35% of MAS's overall income is derived from testimony and testing products for asbestos fiber release. Most of what MAS does is non-asbestos litigation and consulting with industry on potential hazards contained in their products or materials. Also I have performed Work Practice studies on behalf of defendant manufacturers that include GE, Carborundum, American Insulated Wire Corporation, Guard-Line safety apparel and Tecumseh lawn mower engines. These defendants approved of our use of standard methodology for the measurement of airborne asbestos fibers from the use of their products.
16. Attached to this affidavit is a copy of my curriculum vitae, attached as Exhibit "A" which further sets forth my education, experience and research on asbestos issues.

Daubert Motion

17. I have reviewed the Daubert Motion to preclude my testimony filed on behalf of Ametek Inc., Ashland Inc., Hercules Inc. and Champlain Cable Corp. in the Thomas M. Kenny matter. I have prepared this affidavit in response to this Daubert motion concerning issues raised that are, in my opinion, not factually correct.

Chemtite vs. Bondstrand Asbestos-Containing Pipe

18. The primary objection by Ametek to our MAS September 2010 Asbestos-Containing Resin Based Pipe work practice study is that it is not substantially similar to the Chemtite pipe product that Mr. Kenny was exposed to as a bystander.¹ Ametek goes on to say that the asbestos-containing Bondstrand pipe in our possession is a better representation of the Chemtite pipe because they are manufactured in a similar manner and that we should have tested the Bondstrand pipe if we wanted to understand

¹ MAS Work Practice Study "Cutting of an Asbestos-Containing Resin Based Pipe", September 2010, study and video.



the type of exposures that Mr. Kenny would have had to the Chemtite pipe. This assertion by Ametek is wrong.

19. This wrong assertion by Ametek is stated in the Daubert motion as follows:

Ametek statement: Page 5, Paragraph 3, Line 1, “*Curiously, the Bondstrand pipe that Dr. Longo possesses, and which is similar to the Chemtite pipe at issue in this case, has never been tested by Dr. Longo*”.

Response: The composition of the Bondstrand pipe and the Chemtite pipe are completely different and therefore air sample testing during the cutting of the Bondstrand would not be a fair and accurate representation on how the Chemtite asbestos-containing pipe would behave under similar work practices.

Evidence: The reason that they would not be similar is the asbestos content and method of manufacture for the two types of pipe.

Bondstrand asbestos-containing pipe is manufactured with three components that are fiberglass and resin rolled onto a mandrel with one sheet of crocidolite paper that is 0.060 inches thick. This one sheet of crocidolite paper is placed in the center of the wound fiberglass and resin material.² The result of this construction of the Bondstrand pipe produces an asbestos content of approximately 4% when analyzed by our laboratory. The remaining 96% of the Bondstrand is non-asbestos fiberglass and resin. The results of this analysis are shown in Appendix A to this affidavit. Our optical microscopy analysis showing each of the individual layers of the Bondstrand pipe are shown in Appendix B to this affidavit.

Chemtite on the other hand is manufactured with only two components that consist of crocidolite paper and resin that is rolled onto a mandrel. According to the Chemtite interrogatories the pipe consists of 40% by

² Answers and Objections of Champlain Cable Corporation to Plaintiffs’ Interrogatories per Standing Order No. 1, Exhibit “C” in the Superior Court of the State of Delaware in and for New Castle County, C.A. No. 96C—07-226.



weight of crocidolite imbedded in a thermoset resin matrix.³ The Chemtite pipe is manufactured with multiple layers of the crocidolite paper producing a finished pipe that contains crocidolite throughout the thickness of the pipe since it is only a two component system of asbestos paper and resin.

20. As discussed above our own analysis of the MAS Bondstrand pipe samples shows that this product only contains 4% crocidolite as compared to the Chemtite interrogatories stating their pipe product contains 40% crocidolite, this equates to a thousand percent difference in asbestos content between the two manufacturers. But more importantly the crocidolite in the Chemtite pipe is distributed throughout the thickness of the pipe wall whereas the Bondstrand only has the one layer of crocidolite paper sandwiched between the inner and outer layer of their pipe.
21. A simple loaf of bread analogy can be used here to demonstrate the significant difference between the Chemtite and Bondstrand pipe. For the Chemtite pipe, each and every slice of bread that makes up the entire loaf of bread would be a sheet of asbestos paper saturated with the thermoset plastic resin. The Bondstrand pipe on the other hand would consist of only one slice of bread being the asbestos paper, all the other slices of that loaf of bread would consist of the wound fiberglass and thermoset resin.
22. For these reasons stated above, the possible testing of the Bondstrand pipe was considered then rejected as a fair and accurate representation on how either the Chemtite or Haveg pipe would behave during a cutting work practice study.
23. Furthermore, in my January 26, 2011 deposition that was referenced, Ametek in their motion (See Exhibit 1 to their motion) asked me directly if the Bondstrand pipe was comparable to the Chemtite pipe.⁴ There are a series of questions that I was asked starting on page 89 of my deposition

³ Ameron International Corp's Supplemental Responses to Plaintiff's Standard Interrogatories to Defendants (Dieden Interrogatories) in the Superior Court of the State of California for the County of Alameda, Case No. 812236-0.

⁴ Deposition of William E. Longo, Ph.D., January 26, 2011, Peter Friedman and Susan Friedman, his wife, Plaintiffs vs. A.O. Smith Corporation, et al., Defendants in the Circuit Court Third Judicial Circuit Madison County, Illinois Cause No. 09-L-1246.



that makes it crystal clear why the Bondstrand pipe in our possession was not used to determine asbestos exposure levels for the cutting of either Chemtite or Haveg pipe.

Q. Do you consider the pipe referenced in that study, the Bondstrand pipe, to be comparable pipe to the resin-based pipe that you tested?

A. No.

Q. Why is it different, in your opinion?

A. Because of the amount of asbestos in the pipe. It only has a very thin piece of paper in the middle of it-----

Q. And, of course, you're familiar with the composition of Chemtite pipe?

A. I am.

Q. That's a resin-based material correct?

A. Generally I'm not sure if it's all resin based—I mean if it's all paper or putting in materials, but that has—as I read the description of the Chemtite pipe, that has a whole different makeup of it. Not just one layer in the middle of it, but it's rolled up into it.

Q. Do you consider the Chemtite pipe to be more comparable to the Bondstrand pipe?

A. No.

Clearly I discussed with the Ametek attorney why the Bondstrand pipe was not comparable to Chemtite pipe, curiously the Ametek motion failed to provide this information to the courts.

24. Besides the Bondstrand pipe, Ameron also manufactured asbestos-containing molded fittings and flanges. Unlike their three component which has fiberglass, one sheet of asbestos paper and resin pipe material, the molded flanges and fittings were a two component product that were



made with asbestos and resin.^{5, 6} As discussed early in this affidavit, both the Haveg and Chemtite asbestos-containing materials (pipes, flanges & fittings) were also a two component material. Also the amount of asbestos in the Bondstrand molded fittings and flanges were approximately 40 to 50% by weight. This amount of asbestos is also consistent with the Chemtite and Haveg products which contained between 40 to 50% asbestos.

25. The pipe flange that we tested in our September 2010 work practice study was a two component product (asbestos & resin) and contained approximately 40 to 50% asbestos. Based on the composition of the pipe/flange sample that we tested and the composition of the asbestos-containing Chemtite and Haveg pipe and flanges, it has always been my opinion that the material we tested in our 2010 work practice study is a fair and accurate representation of how either the Chemtite or Haveg flanges and pipes would behave under similar testing conditions.
26. This opinion about the similarity of the molded pipe/flange sample that we tested in or MAS 2010 study to either the Chemtite or Haveg product is not new information to Ametek.
27. In my January 26, 2011 deposition on page 66, line 9, I state the following:

“ But for my opinions on how phenolic—excuse me, how resin-based pipes behave, flanges behave, I believe it’s a fair and accurate representation for any of the three, Ameron’s molded flange, Haveg’s molded flange, or Chemite’s molded flange.”

⁵ Deposition of Clarence Baxter, September 11, 2006 in Wilda Jean Lathum, widow of Jerry H. Lathum, deceased, Plaintiffs, vs. Insulation, Inc., et al., Defendants in the District Court of Tulsa County State of Oklahoma No. CJ-2005-3619.

⁶ Deposition of Richard Perry, September 13, 2006 in Wilda Jean Lathum, widow of Jerry H. Lathum, deceased, Plaintiffs, vs. Insulation, Inc., et al., Defendants in the District Court of Tulsa County State of Oklahoma No. CJ-2005-3619.



28. I also gave answers to Ametek on this same issue in my October 19, 2010 deposition.⁷

On page 31 line 23, the following question an answer was asked and given:

Q. You do not have sufficient information about which you could testify that this flange that you tested was not manufactured by Ameron, correct?

A. I'm not stating within a reasonable degree of scientific certainty that it was made by Ameron or Haveg. All I'm stating within a reasonable degree of scientific certainty that whoever made this, it's a fair and accurate representation of the type of exposure levels that folks would get from either Ameron or Haveg or Chemtite when they had to cut it with a power saw or a handsaw.

29. This testimony of mine provided to Ametek in the past, on two different occasions, clearly discusses how the molded pipe/flange we tested in September of 2010 was comparable to both the asbestos-containing Haveg and Chemtite pipe and flanges that Ametek manufactured in the past.

Plaintiff's Expert Testimony

30. In Ametek's motion they state that plaintiff's experts agree that the Chemtite pipe that is at issue in this case is not comparable. This is not what both experts stated and that Ametek references in their motion.

Ametek statement: Page 6, paragraph 2, Line 8, *"Therefore, according to Plaintiff's own experts, the resin-based asbestos pipe Dr. Longo tested, and on which he will rely for his opinions at trial of this matter, is not comparable to the pipe at issue in this case"*.

Response: This statement by Ametek about my testimony is simply not true as discussed in the previous sections of this affidavit.

⁷ Deposition of William E. Longo, Ph.D., October 19, 2010 in Darrell Bingham and Debora Bingham, vs. A.W. Chesterton Co., et al. in the District Court of Harris County, Texas 11th Judicial District Cause No. 2009-19572.



31. In Ametek's motion they also state the following on this issue:

Ametek statement: Page 6. Paragraph 2, Line 6, "*Steven Paskal, recognized in his deposition, the Bondstrand pipe is substantially similar in manufacture to the Chemtite pipe at issue in this litigation*"

Response: The testimony by Steven Paskal that was referenced by Ametek was taken completely out of context for what Mr. Paskal was testifying about when asked about the similarity of the Bondstrand pipe to Chemtite products. The following is the actual question and answer that Mr. Paskal gave.

Q. ---If you assume that that is accurate, that that is accurate in how Chemtite pipe was made, would you agree with me, Mr. Paskal, that it is a substantially similar to how the Bondstrand pipe was manufactured?

A. In what's material from an **industrial hygiene** standpoint and the operations involved, yes.

This answer given by Mr. Paskal was not if the two products (Bondstrand & Chemtite) were the same as a material scientist, but as an industrial hygienist. Mr. Paskal's answer had to do with the fact that both materials contained some amount of asbestos and when you cut these materials, there will be a release of airborne asbestos fibers. This is why he stated "from an industrial hygiene standpoint".

Interestingly enough the Ametek attorney never showed Mr. Paskal our September 2010 study or provided any information about the content of the pipe/flange material that MAS tested. So therefore Mr. Paskal was never given the opportunity to opine about the similarities of the asbestos-containing pipe/flange that we tested as compared to the asbestos-containing Chemtite product.



Dr. Longo's September 2010 test on resin-based asbestos-pipe was performed in an environment unlike Plaintiff's work environment

32. All of our work place studies are performed in our Exposure Characterization Laboratory (ECL) under controlled conditions and I have never testified that our ECL asbestos fiber release studies replicate any work place environment, this would be impossible because of all the factors involved.

Also we cannot test any asbestos products at any work sites today because of federal regulations that require that the release of any airborne asbestos fibers need to be controlled to a degree that no visible airborne asbestos dust can be released into the environment.

33. What our ECL work practice studies do is to test asbestos-containing materials under controlled conditions, using typical work procedures, so that we can have an understanding of the magnitude of the airborne asbestos fiber concentrations for these work practices with a particular asbestos-containing product. This allows us to have some idea of the potential range of exposures to individuals who either work with or around the products that we tested.
34. I have never stated that the actual asbestos airborne concentration levels that we measure, under controlled conditions, is what a worker would have been exposed to when the same type of asbestos-containing products and work practices are tested inside our ECL. However, based on the magnitude of asbestos fiber release that we find in our ECL studies, I can provide testimony of the potential ranges of asbestos exposure that an individual may have had at a work site.
35. In this section of the Ametek motion that provides so called statements that according to them verify that both myself and Mr. Paskal agree with their position that the asbestos levels that we measured when cutting the resin based pipe in our 2010 study would be higher then if the same work were performed at a work site.

Interestingly enough the statements that Ametek says that we made in our deposition are somewhat different than the testimony in the actual depositions.



Ametek statement: Page 7, paragraph 1, line 4: *“Dr. Longo acknowledged that testing in a chamber could result in higher measurements (Chris, I think we need to insert higher measurements of what? Levels of asbestos fibers?).”*

Response: Ametek references Exhibit “1” page 73 lines 3-10, lines 13-25; page 74 lines 1-14. A review of those two pages of my January 26, 2011 deposition does not contain this statement that Ametek claims I said.

What I actually testified to is as follows on those two pages:

Page 73, lines 3-10:

Q. As you agree in the past, the fact that the studies with asbestos-containing products are done in this room, in an enclosure, could affect the measurements, the amount of fibers that are actually caught as opposed to if the studies were done in an industrial setting or outside, correct?

A. That’s correct. It could be higher, it could be lower.

Page 73, lines 13-25 & page 74, lines 1-14.

Q. —and firsthand, when—have you seen the video itself?

A. Yes.

Q. Of course, you were there and watched the cutting as well?

A. That’s correct.

Q. Is it correct that as either the metal blade or the masonry blade was used on the pipe to cut the flange to cut it, that dust generated in the very beginning of it was pushed away from the worker, visibly that’s what we saw; is that right?

A. I would agree.

Q. Eventually that dust hit the wall. And I don’t know what the term is scientifically, but it bounced back, correct?

A. Correct.



Q. And that chamber as the cutting continued, continued to bounce off the wall and engulf the worker, Paul, in dust?

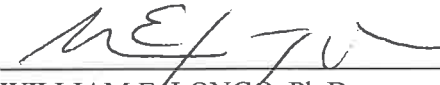
A. Well, bounce off a wall is—I'm not sure you can bounce off the wall. When you're using a power tool that generates an airstream, it will move dust around more than if you were hand sanding so it does produce higher levels.

No where in these two pages do I ever state *(Chris, I think we need to insert higher measurements of what? Levels of asbestos fibers?)*

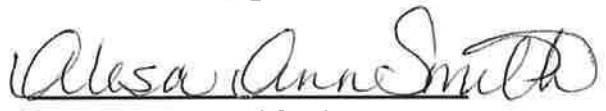
36. As for higher levels measured in our chamber versus an outside environment I have always stated that the amount of airborne asbestos we measure in our ECL could be either higher or lower than actual airborne concentration measurements at a work site for the same product and work practices. This would of course be dependent on the particular environmental conditions at that work site when the asbestos product was used. This is why we only provide a possible range of asbestos exposures when we utilize our data based on our ECL work practice studies.

37. It should be noted that the ECL is not under static conditions during these tests. In fact there is fairly aggressive air ventilation moving through the ECL when we perform our work practice studies. For the MAS September 2010 study on the asbestos-containing resin-based pipe sample we tested, the ventilation rate through the ECL was about 200 cubic feet per minute of air.

FURTHER, AFFIANT SAYETH NOT."


WILLIAM E. LONGO, Ph.D.

SWORN TO AND SUBSCRIBED before me, on the 30th day of June, 2011
to certify which witness my hand and seal of office.


Notary Public in and for the
State of Georgia

My Commission Expires: June 15, 2012 .

Exhibit E

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF NEW JERSEY

IN RE: JOHNSON & JOHNSON
TALCUM POWDER PRODUCTS
MARKETING SALES
PRACTICES, AND PRODUCTS
LIABILITY LITIGATION } MDL NO.16-2738 (FLW) (LHG)

VIDEO-RECORDED DEPOSITION OF
WILLIAM E. LONGO, PH.D.

February 5, 2019
10:24 a.m.

Suite 100
11555 Medlock Bridge Road
Johns Creek, Georgia

Frances Buono, RPR, CCR-B-791

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George Montiel, Videographer

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10:21:28 6	videographer.)		
10:21:28 7	WILLIAM E. LONGO, PH.D.,		
8	having been first duly sworn, was examined and		
10:23:47 9	testified as follows:		
10:23:47 10	EXAMINATION		
10:23:51 11	BY MR. CHACHKES:		
10:23:51 12	Q.	Good morning, Dr. Longo.	
10:24:24 13	A.	Good morning.	
10:24:25 14	Q.	And my name is Alex Chachkes; I represent	
10:24:29 15	J&J.	We've met before; right?	
10:24:31 16	A.	Yes, sir, we have.	
10:24:32 17	MR. CHACHKES: Okay. I want to begin the		
10:24:34 18	depo with an objection to the late productions.		
10:24:35 19	On Saturday we received a new 92-page report and		
10:24:39 20	almost 7,000 pages of new back-up material. On		
10:24:43 21	Sunday we received supplemental reports, two new		
10:24:46 22	reports from J3 and hundreds of other pages.		
10:24:50 23	So when we conclude today we are going to		
10:24:55 24	expressly keep the deposition open subject to		
10:24:57 25	our analysis of the new production; and if it		
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<p>10:24:58 1 turns out that it is material that if we had</p> <p>10:25:00 2 gotten earlier we would have asked about today,</p> <p>10:25:03 3 we are going to recall the witness.</p> <p>10:25:06 4 MS. O'DELL: Well, we would object to any</p> <p>10:25:08 5 motion to hold the deposition open. The</p> <p>10:25:10 6 requests that were made for data that was</p> <p>10:25:13 7 supplied on Saturday and earlier in the week</p> <p>10:25:17 8 were late requests, actually only received five</p> <p>10:25:22 9 or I think it was seven days beforehand, they</p> <p>10:25:23 10 were timely produced, and you've had sufficient</p> <p>10:25:26 11 time to review them.</p> <p>10:25:27 12 The supplement that you're referring to</p> <p>10:25:28 13 that was produced on Sunday corrected a couple</p> <p>10:25:32 14 of typographical errors and clarified the</p> <p>10:25:37 15 identification of a sample, none of which is</p> <p>10:25:40 16 sufficient to hold the deposition open, so we</p> <p>10:25:42 17 are going to oppose any such motion. Today's</p> <p>10:25:46 18 your opportunity to depose Dr. Longo on these</p> <p>10:25:48 19 samples.</p> <p>10:25:49 20 MR. CHACHKES: Obviously, we disagree, and</p> <p>10:25:51 21 we thought that material should have been</p> <p>10:25:53 22 produced and we should not have to fight for it,</p> <p>10:25:56 23 but it's a fight for another day.</p> <p>10:25:58 24 So we've premarked some exhibits, some</p> <p>10:26:00 25 things I'm sure we will be coming back to later.</p> <p>Atlanta Reporters, Inc. 866-344-0459 www.atlanta-reporters.com</p>	<p>10:26:49 1 So Exhibit 2 is your January 16 expert</p> <p>10:26:54 2 report in this matter minus the backup data that was</p> <p>10:26:57 3 attached to it when it was produced; is that correct?</p> <p>10:27:00 4 A. Yes, sir.</p> <p>10:27:00 5 Q. Okay. And then Exhibit 3 is your</p> <p>10:27:06 6 November 14 report in this matter which was, I</p> <p>10:27:09 7 assume, superseded by Exhibit 2; correct?</p> <p>10:27:12 8 A. Correct.</p> <p>9 (Defendants' Exhibits 4, 5, and 6 were</p> <p>10:27:13 10 marked for identification.)</p> <p>10:27:13 11 Q. (By Mr. Chachkes) Okay. What's been</p> <p>10:27:15 12 marked as Exhibits 4, 5 and 6, can you confirm that</p> <p>10:27:19 13 these are ISO 22262-1, -2, and -3?</p> <p>10:27:29 14 A. Yes, sir.</p> <p>10:27:30 15 Q. So 1 will be 4, 2 will be 5, and 3 will be</p> <p>10:27:37 16 6.</p> <p>17 (Defendants' Exhibit 7 was marked for</p> <p>18 identification.)</p> <p>10:27:43 19 Q. (By Mr. Chachkes) And then what's been</p> <p>10:27:45 20 marked as Exhibit 7 is your second supplemental</p> <p>10:27:52 21 report minus the backup data that was attached to it</p> <p>10:27:56 22 dated February 1, 2019; is that correct?</p> <p>10:28:00 23 A. Yes, sir.</p> <p>10:28:00 24 Q. And it's my understanding that this report</p> <p>10:28:05 25 supersedes what's been marked as Exhibit 2; is that</p> <p>Atlanta Reporters, Inc. 866-344-0459 www.atlanta-reporters.com</p>
<p>10</p> <p>10:26:02 1 What I want to do is maybe just go through those</p> <p>10:26:04 2 quickly so they are on the record.</p> <p>3 (Defendants' Exhibit 1 was marked for</p> <p>4 identification.)</p> <p>10:26:08 5 Q. (By Mr. Chachkes) Dr. Longo, you can</p> <p>10:26:08 6 confirm what's been marked as Exhibit 1 is your CV;</p> <p>7 is that correct?</p> <p>10:26:15 8 A. Yes, sir.</p> <p>10:26:15 9 Q. And are there any updates to this since we</p> <p>10:26:17 10 received it?</p> <p>10:26:18 11 A. No, sir.</p> <p>12 (Defendants' Exhibits 2 and 3 were marked</p> <p>10:26:18 13 for identification.)</p> <p>10:26:18 14 Q. (By Mr. Chachkes) Okay. What's been</p> <p>10:26:20 15 marked as Exhibit 2 is your January 16 expert report</p> <p>10:26:30 16 extracted --</p> <p>10:26:33 17 MS. O'DELL: November 14.</p> <p>10:26:33 18 Q. (By Mr. Chachkes) I'm sorry. What has</p> <p>10:26:34 19 been marked as Exhibit 2 is your November 14 expert</p> <p>10:26:36 20 report in this matter minus the backup data.</p> <p>10:26:39 21 Can you confirm that?</p> <p>10:26:40 22 A. This is actually the January 15.</p> <p>10:26:43 23 Q. So --</p> <p>10:26:46 24 A. November 14 is Exhibit 3.</p> <p>10:26:48 25 Q. All right. Let's do that again.</p> <p>Atlanta Reporters, Inc. 866-344-0459 www.atlanta-reporters.com</p>	<p>12</p> <p>10:28:12 1 correct? So it supersedes the January report?</p> <p>10:28:15 2 A. Yes, sir.</p> <p>10:28:17 3 Q. And my understanding is that the only</p> <p>10:28:19 4 difference between Exhibit 7 and Exhibit 2 is</p> <p>10:28:21 5 Exhibit 7 corrects some typos?</p> <p>10:28:25 6 MS. O'DELL: Object to the form.</p> <p>10:28:29 7 THE WITNESS: The second supplement</p> <p>10:28:30 8 report, essentially it was to clarification on</p> <p>10:28:35 9 the Lee Poye J&J STS samples, 31F and 31G, and</p> <p>10:28:43 10 it is J&J sample -- hold on, I want to get the</p> <p>10:28:53 11 right numbers. Throws me off on two-sided. 77.</p> <p>10:29:28 12 Q. (By Mr. Chachkes) That's okay. You've</p> <p>10:29:30 13 given me the 31F and 31G. So am I correct in my</p> <p>10:29:34 14 understanding that Exhibit 7 does more than correct</p> <p>10:29:38 15 typos?</p> <p>10:29:39 16 A. Yes. Exhibit 7 does not have any new</p> <p>10:29:45 17 analytical data. The two samples that Lee Poye</p> <p>10:29:48 18 had -- and I will just give the numbers -- the 31F</p> <p>10:29:52 19 and the 31G I misunderstood. I thought that was</p> <p>10:29:54 20 actually two samples from the same container.</p> <p>10:29:57 21 It's actually one sample from two</p> <p>10:30:00 22 different containers. The STS in it looks like a</p> <p>10:30:03 23 gift wrapped for the spice and the regular. So</p> <p>10:30:08 24 that's actually two containers for each sample. So</p> <p>10:30:11 25 the number of containers was increased.</p> <p>Atlanta Reporters, Inc. 866-344-0459 www.atlanta-reporters.com</p>

10:30:13 **1** But the analytical data had been already
10:30:16 **2** produced. Nothing changed in the analytical data.
10:30:19 **3** And then we had some typos that we endeavored to
10:30:24 **4** correct.
10:30:24 **5** Q. Okay. And those are typos you found or
10:30:26 **6** that counsel found?
10:30:29 **7** MR. CIRSCH: Object to form.
10:30:31 **8** THE WITNESS: Well, one of them counsel
10:30:33 **9** found, and that was the counsel for Johnson &
10:30:35 **10** Johnson, at my previous deposition on MDL.
10:30:37 **11** There were some positive samples on a chart that
10:30:40 **12** were negative in the overall data, so I decided
10:30:43 **13** to go through and make sure everything was
10:30:45 **14** correct again.
10:30:47 **15** Q. (By Mr. Chachkes) What about the other
10:30:48 **16** typos, you found those or counsel?
10:30:52 **17** MR. CIRSCH: To the extent -- I would not
10:30:53 **18** have you reveal, Dr. Longo, anything that's work
10:30:56 **19** product is protected under Rule 26. But if you
10:30:58 **20** can answer aside from that, please do.
10:31:01 **21** THE WITNESS: No, counsel did not
10:31:02 **22** participate in helping to find typos.
10:31:04 **23** Q. (By Mr. Chachkes) Okay. So you found
10:31:05 **24** them personally?
10:31:06 **25** A. Personally and Dr. Rigler.
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1 (Defendants' Exhibits 8, 9, 10, and 11
10:31:08 **2** were marked for identification.)
10:31:08 **3** Q. (By Mr. Chachkes) Okay. And now
10:31:09 **4** Exhibit 8, if you would look at that, if you could
10:31:12 **5** confirm, is the January 31 quality control -- quality
10:31:19 **6** assurance report that you created in this case?
10:31:22 **7** A. Yes, sir.
10:31:22 **8** Q. Okay. And then Exhibit 9, which is more
10:31:28 **9** for the record than you because you can't confirm it,
10:31:30 **10** it is a USB with the three reports in this case, the
10:31:36 **11** November 1, the January 1, and the recent -- sorry.
10:31:42 **12** Okay. So it is November, January, and the March 2018
10:31:46 **13** report are all in full on Number 9. It's just too
10:31:50 **14** much paper so we put it on the USB.
10:31:52 **15** Can you confirm that Exhibit Number 10 is
10:31:59 **16** a letter to you from J3 dated December 12, 2018,
10:32:04 **17** about the MAS split of 21 historic talc samples by
10:32:13 **18** XRD?
10:32:14 **19** MR. CIRSCH: It's actually December 20.
20 MR. CHACHKES: What did I say?
10:32:20 **21** MR. CIRSCH: December 12.
10:32:20 **22** Q. (By Mr. Chachkes) I'm sorry. So it's
23 December --
24 MS. TROVATO: No, you're right. You're
25 right.
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10:32:20 **1** MR. CHACHKES: So which ones, then?
2 MS TROVATO: December 12 is 10.
10:32:22 **3** Q. (By Mr. Chachkes) Okay. So December 12
10:32:23 **4** is Exhibit 10; is that correct?
10:32:26 **5** A. Yes.
10:32:28 **6** Q. Okay. You should probably look at your
10:32:30 **7** own copies, not mine.
10:32:31 **8** A. Did I get a copy?
10:32:33 **9** Q. Yes, you did.
10:32:34 **10** A. Okay. Sorry.
10:32:35 **11** Yes, that's correct.
10:32:36 **12** Q. Okay. And Exhibit Number 11, we
10:32:40 **13** premarked, is another letter from J3 dated
10:32:44 **14** December 20 to you; correct?
10:32:46 **15** A. Correct.
10:32:46 **16** Q. All right.
10:32:52 **17** MR. CIRSCH: I'm sorry again, but
10:32:55 **18** Exhibit 10 I have says December 20 as well, so
10:32:57 **19** maybe that's -- okay. I just got two of them.
10:33:00 **20** Never mind.
10:33:04 **21** Q. (By Mr. Chachkes) You received your
10:33:06 **22** doctor's in philosophy in materials science and
10:33:08 **23** engineering; correct?
10:33:10 **24** A. Yes.
10:33:10 **25** Q. You're not a geologist?
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10:33:12 **1** A. I am not a geologist.
10:33:13 **2** Q. You're not a mineralogist?
10:33:15 **3** A. I did not take any courses in mineralogy.
10:33:17 **4** Q. Do you consider yourself an expert in
10:33:19 **5** mineralogy?
10:33:20 **6** A. Usually that's up to the courts.
10:33:22 **7** Certainly I believe I have more knowledge than the
10:33:25 **8** average layperson, but I do not hold myself out with
10:33:28 **9** any degrees in mineralogy.
10:33:29 **10** Q. Okay. You're not a certified industrial
10:33:31 **11** hygienist?
10:33:31 **12** A. No, I'm not.
10:33:33 **13** Q. You've done exposure assessments, though;
14 correct?
10:33:37 **15** A. Yes.
10:33:37 **16** Q. All right. You're an expert in exposure
10:33:41 **17** assessments?
10:33:42 **18** A. Again, I'm not sure what that means. I
10:33:45 **19** certainly have done a number of studies in which we
10:33:48 **20** have determined typical exposures from both
10:33:52 **21** asbestos-added construction industrial products as
10:33:56 **22** well as what I call hygiene exposure studies
10:33:59 **23** involving Johnson & Johnson cosmetic talc samples.
10:34:04 **24** Published on our exposure assessments in
10:34:06 **25** the past. We use all standard protocols that are
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10:34:13 **1** accepted by the community of scientists who do this
10:34:17 **2** type of work. Been qualified many times in court as
10:34:20 **3** an industrial hygienist specifically to asbestos.
10:34:23 **4** So again, I have probably more knowledge
10:34:26 **5** than the average layperson on doing exposure
10:34:29 **6** assessment type studies involving asbestos.
10:34:32 **7** Q. When a plaintiff has been exposed to
10:34:34 **8** multiple different talc-based products, each of which
10:34:37 **9** could possibly contain asbestos, is it best to
10:34:40 **10** analyze the asbestos content of each product?
10:34:43 **11** MR. CIRSCH: Object to form.
10:34:46 **12** THE WITNESS: I'm not sure it's required
10:34:48 **13** to analyze each product. You will have to
10:34:51 **14** clarify. Do you mean each different
10:34:53 **15** manufacturer or from different talc sources,
10:34:57 **16** such as the Italian or the Vermont or Montana?
10:35:02 **17** Q. (By Mr. Chachkes) Let's say different
10:35:03 **18** manufacturers. Let's say a plaintiff has been
10:35:06 **19** exposed to talc-based products from three
10:35:08 **20** manufacturers. Is it best to analyze the asbestos
10:35:10 **21** content from each of the three manufacturers?
10:35:13 **22** MR. CIRSCH: Object to form.
10:35:15 **23** THE WITNESS: Certainly we try to do that;
10:35:16 **24** but if three manufacturers all have to use the
10:35:22 **25** talcum powder source is Italy, Italian, I think
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18
10:35:26 **1** you can imply that if one manufacturer's Italian
10:35:30 **2** talc has measurable levels or detectable levels
10:35:35 **3** of amphibole asbestos, then the other
10:35:40 **4** manufacturer more likely than not would have
10:35:41 **5** similar types of concentrations, depending on
10:35:44 **6** their processing flotation, et cetera.
10:35:46 **7** If you have different manufacturers from
10:35:49 **8** completely different mines and you haven't
10:35:51 **9** analyzed anything from the particular talc mine,
10:35:54 **10** which has happened to me in the past, I
10:35:56 **11** typically say I don't have any opinions.
10:35:58 **12** Q. (By Mr. Chachkes) Okay. If you're trying
10:36:01 **13** to determine which manufacturer's talc contributed
10:36:04 **14** what level of exposure to asbestos, do you need to
10:36:09 **15** analyze all the different manufacturers' products?
10:36:13 **16** MR. CIRSCH: Object to form.
10:36:15 **17** THE WITNESS: Again, it depends on who the
10:36:16 **18** manufacturer is. It's sort of an incomplete
10:36:19 **19** hypothetical.
10:36:19 **20** Q. (By Mr. Chachkes) Okay. Let me complete
10:36:20 **21** it, then.
10:36:22 **22** So hypothetically, if there's three
10:36:23 **23** manufacturers each from a different geological
10:36:26 **24** location, if you're trying to determine the exposure
10:36:29 **25** of a plaintiff, do you need to -- and what percentage
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10:36:34 **1** of the asbestos exposure came from which talc, would
10:36:37 **2** you need to analyze all three?
10:36:39 **3** MR. CIRSCH: Object to form.
10:36:40 **4** THE WITNESS: Again, that's an incomplete
10:36:41 **5** hypothetical. If we had never analyzed any
10:36:44 **6** manufacturer's source of talc from any
10:36:47 **7** particular location, then as I stated earlier, I
10:36:51 **8** would not have an opinion about that particular
10:36:53 **9** manufacturer.
10:36:54 **10** If they come from things like, again,
10:36:57 **11** Vermont, Italy, say the Korean mines, then we
10:37:03 **12** have a pretty good understanding of the levels
10:37:05 **13** of amphibole asbestos that are typically found
10:37:09 **14** in the products from those mines.
10:37:11 **15** Q. (By Mr. Chachkes) Okay. So you feel
10:37:12 **16** confident that you can testify to the amount of
10:37:16 **17** amphiboles you expect in a bottle based solely on the
10:37:19 **18** geography from which the bottle comes?
10:37:23 **19** MR. CIRSCH: Object to form.
10:37:24 **20** THE WITNESS: I didn't say that.
21 Q. (By Mr. Chachkes) Okay.
10:37:25 **22** A. What I would say is we have analyzed a
10:37:27 **23** number of samples from other manufacturers, two
10:37:32 **24** different manufacturers, three different
10:37:33 **25** manufacturers, where, say, the source is Italy, so I
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20
10:37:36 **1** know that there will be significant concentrations in
10:37:39 **2** some percentage of the samples.
10:37:40 **3** Q. Okay. So let's say you have three bottles
10:37:43 **4** from three geographical locations that you haven't
10:37:46 **5** analyzed in the past. Do you need to analyze each
10:37:48 **6** bottle to determine the percentage of asbestos
10:37:51 **7** exposure per manufacturer?
10:37:55 **8** MR. CIRSCH: Object to form.
10:37:56 **9** THE WITNESS: When you say each bottle, I
10:37:58 **10** have five from each or two from each or ten from
10:38:01 **11** each?
10:38:01 **12** Q. (By Mr. Chachkes) So does it matter?
10:38:04 **13** A. I don't know. I mean, it's a
10:38:07 **14** hypothetical. If we had not tested any samples from
10:38:10 **15** any particular geological location, I would not
10:38:15 **16** provide opinions on any -- the potential for
10:38:18 **17** amphibole asbestos, regulated amphibole asbestos to
10:38:21 **18** be in those containers.
10:38:22 **19** Q. Would you agree it's important to at least
10:38:28 **20** determine a plaintiff's exposure to asbestos on a
10:38:31 **21** comparative basis if there were multiple sources of
10:38:36 **22** exposure?
10:38:38 **23** MR. CHACHKES: Object to form.
10:38:41 **24** THE WITNESS: Depends on the information.
10:38:43 **25** If the particular plaintiff says I use
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10:38:47 **1** manufacturer X, manufacturer Y, manufacturer Z,
 10:38:52 **2** and I used them all 33.33 percent each and they
 10:38:57 **3** all come from the same geological formation of
 10:39:01 **4** where cosmetic talc is being used in those
 10:39:04 **5** containers, then my opinion would be if it is a
 10:39:08 **6** geological location that we have tested in the
 10:39:11 **7** past, that they would all have similar -- that
 10:39:15 **8** the manufacturers would have similar exposures.
 10:39:17 **9** If one of the manufacturers was, well,
 10:39:20 **10** I've got a gift -- for example, if I got a gift
 10:39:22 **11** bag once a year and I would use it and that's
 10:39:26 **12** all, then I would say that the primary exposure
 10:39:28 **13** is from the other manufacturers.
 10:39:29 **14** So it just depends on the circumstances.
 10:39:31 **15** **Q.** (By Mr. Chachkes) Okay. You're not a
 10:39:33 **16** pathologist?
 10:39:34 **17** **A.** No, sir, I'm not.
 10:39:35 **18** **Q.** You have no medical training?
 10:39:37 **19** **A.** No, sir, I don't have any medical
 10:39:39 **20** training.
 10:39:39 **21** **Q.** Are you a statistician?
 10:39:41 **22** **A.** I'm not a statistician.
 10:39:42 **23** **Q.** Are you a geostatistician?
 10:39:45 **24** **A.** I'm not that kind of statistician either.
 10:39:48 **25** **Q.** Okay. So in light of the reports that we
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10:40:55 **1** MR. CIRSCH: Object to form.
 10:40:56 **2** THE WITNESS: I don't recall the exact
 10:40:57 **3** words, no.
 10:40:57 **4** **Q.** (By Mr. Chachkes) Okay. Do you agree
 10:40:58 **5** that if you want to know whether there's asbestos in
 10:41:00 **6** talc, you would go to either your lab or Lee Poye's
 10:41:03 **7** lab and that's it?
 10:41:04 **8** MR. CIRSCH: Object to form.
 10:41:05 **9** THE WITNESS: It depends on the
 10:41:06 **10** circumstances. If you're going to understand
 10:41:09 **11** what's your best opportunity to see and get the
 10:41:12 **12** appropriate detection limits, I'm only aware of
 10:41:16 **13** Lee Poye and our lab that use routinely the
 10:41:21 **14** heavy liquid density separation method.
 10:41:22 **15** There may be other labs out there doing
 10:41:24 **16** it, but that's the only two I know at the
 10:41:26 **17** moment.
 10:41:26 **18** **Q.** (By Mr. Chachkes) Okay. So you know of
 10:41:27 **19** no other labs besides yours and Lee Poye that can
 10:41:32 **20** accurately determine whether there's asbestos in
 10:41:35 **21** talc, at least using the concentration method?
 10:41:38 **22** MR. CIRSCH: Object to form.
 10:41:39 **23** THE WITNESS: Accurately determine? It's
 10:41:41 **24** all about getting the best analytical
 10:41:44 **25** sensitivity. So analytical sensitivities and
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22
 10:39:50 **1** have in this case, are you here to testify in your
 10:39:53 **2** capacity as a microscopist; is that accurate?
 10:39:57 **3** MR. CIRSCH: Object to form.
 10:39:58 **4** THE WITNESS: I'm here to testify on the
 10:40:01 **5** qualifications I have and have been accepted in
 10:40:03 **6** the past. I'm a material scientist; I'm an
 10:40:07 **7** industrial hygienist; I have many expertise in
 10:40:10 **8** the analysis of asbestos.
 10:40:13 **9** My testimony in the past has been that any
 10:40:17 **10** particular types of manufacturers where we have
 10:40:21 **11** analyzed the talc and we have analyzed the
 10:40:24 **12** source -- know the source, that more likely than
 10:40:28 **13** not there would have been a significant exposure
 10:40:32 **14** based on the percentages of the samples that are
 10:40:34 **15** positive. That's as far as I go.
 10:40:36 **16** **Q.** (By Mr. Chachkes) You've testified in the
 10:40:38 **17** past the following: In my opinion, if you want to
 10:40:41 **18** know if there's asbestos in talc, you would go to
 10:40:44 **19** either our lab or Lee Poye's lab and that's it.
 10:40:47 **20** Do you recall that testimony?
 10:40:49 **21** MR. CIRSCH: Object to form. Do you have
 10:40:51 **22** a copy of the testimony you can show the
 10:40:53 **23** witness?
 10:40:53 **24** **Q.** (By Mr. Chachkes) Do you recall that
 10:40:53 **25** testimony?
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24
 10:41:48 **1** using the non-heavy liquid density separation
 10:41:50 **2** method for TEM is usually in the low to 10 to 12
 10:41:59 **3** million fibers per gram.
 10:42:01 **4** The heavy liquid density separation can
 10:42:04 **5** reduce that; at least in our lab we have gotten
 10:42:06 **6** as low as 3,000 fibers/bundles per gram. I know
 10:42:11 **7** the R.J. Lee Group used the Blount heavy density
 10:42:16 **8** liquid separation method once for TEM. There is
 10:42:19 **9** an ISO protocol for it, so there may be other
 10:42:21 **10** labs that I'm not aware of.
 10:42:23 **11** **Q.** (By Mr. Chachkes) So are you the only
 10:42:24 **12** lab -- you and Lee Poye -- who can detect 3,000
 10:42:29 **13** structures per gram?
 10:42:32 **14** MR. CIRSCH: Object to form.
 10:42:34 **15** THE WITNESS: I don't know. Anybody
 10:42:35 **16** following the heavy liquid density measurement
 10:42:37 **17** technique should be able to achieve detection
 10:42:39 **18** limits --
 10:42:39 **19** **Q.** (By Mr. Chachkes) Okay.
 10:42:39 **20** **A.** -- as such.
 10:42:40 **21** **Q.** So your opinion about the high
 10:42:43 **22** qualifications of your lab and Lee Poye's lab, it's
 10:42:45 **23** not based on different methodologies; it's just based
 10:42:48 **24** on your opinion that you do it better?
 10:42:50 **25** MR. CIRSCH: Object to form.
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10:42:51 **1** THE WITNESS: Well, it's not really doing
10:42:52 **2** it better; it's just following the appropriate
10:42:54 **3** protocol for the analytical sensitivities.
10:42:57 **4** There may be other labs out there. John
10:43:00 **5** Fitzgerald's lab may be doing it now. I don't
10:43:01 **6** know.
10:43:03 **7** **Q.** (By Mr. Chachkes) Okay.
10:43:04 **8** **A.** **That's the only two I'm aware of that are**
10:43:06 **9** **routinely doing it now.**
10:43:07 **10** **Q.** MAS has been testing talc for asbestos by
10:43:11 **11** TEM since 2017; is that correct?
10:43:14 **12** MR. CIRSCH: Object to form.
10:43:16 **13** THE WITNESS: We have been testing
10:43:17 **14** cosmetic talc since early 2017. We have tested
10:43:21 **15** industrial talc all the way back to the 1990s,
10:43:27 **16** early 2000s.
10:43:28 **17** **Q.** (By Mr. Chachkes) MAS has been testing
10:43:32 **18** talc for asbestos by PLM since about October of 2018;
10:43:36 **19** is that correct?
10:43:36 **20** MR. CIRSCH: Object to form.
10:43:41 **21** THE WITNESS: I don't know when we got
10:43:43 **22** started testing industrial talc for PLM.
10:43:46 **23** Probably way back in the 1990s, early 2000s.
10:43:51 **24** We've recently started analyzing cosmetic
10:43:56 **25** talc using the ISO 22262-1 and the Blount PLM
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10:44:05 **1** method enhanced, not your typical analysis. I
10:44:11 **2** don't know when we got started last year.
10:44:13 **3** **Q.** (By Mr. Chachkes) Okay. Is it possible
10:44:16 **4** you didn't start looking at cosmetic talc by PLM
10:44:19 **5** until October of 2018?
10:44:21 **6** MR. CIRSCH: Object to form.
10:44:23 **7** THE WITNESS: Well, unless I can go and
10:44:24 **8** look and verify, all I can say is I don't recall
10:44:26 **9** when we started analyzing cosmetic talc by PLM.
10:44:31 **10** **Q.** (By Mr. Chachkes) Have any academic
10:44:33 **11** institutions endorsed MAS as one of the best labs in
10:44:37 **12** the world to test talc?
10:44:39 **13** **A.** **If they have, they haven't let me know.**
10:44:41 **14** **Q.** Has MAS received any accolades from any
10:44:44 **15** academic institutions for its talc testing?
10:44:47 **16** **A.** **Not that I'm aware of.**
10:44:49 **17** **Q.** Have any nationally or internationally
10:44:51 **18** renowned TEM scientists identified MAS as one of the
10:44:55 **19** best labs in the world for testing talc?
10:44:58 **20** MR. CIRSCH: Object to form.
10:45:01 **21** THE WITNESS: I don't know who these
10:45:03 **22** internationally recognized experts are. We're
10:45:06 **23** just following a standard protocol to analyze
10:45:09 **24** talc using the most appropriate sensitivities
10:45:14 **25** for analytical sensitivities.
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10:45:16 **1** **Q.** (By Mr. Chachkes) So you're not aware of
10:45:17 **2** any TEM scientists who's not taking plaintiff
10:45:23 **3** lawyers' money who has recognized MAS as one of the
10:45:26 **4** best labs in the world for testing talc?
10:45:29 **5** MR. CIRSCH: Object to form.
10:45:31 **6** THE WITNESS: I don't recall any TEM
10:45:33 **7** analyst being paid by plaintiffs' attorneys or
10:45:37 **8** any TEM analyst paid by defense attorneys that
10:45:38 **9** are calling me and saying good job, Bill.
10:45:41 **10** **Q.** (By Mr. Chachkes) Have any nationally or
10:45:45 **11** internationally renowned PLM scientists identified
10:45:47 **12** MAS as one of the best labs in the world for testing
13 talc?
10:45:48 **14** MR. CIRSCH: Object to form.
10:45:50 **15** THE WITNESS: I don't know who these
10:45:52 **16** internationally renowned PLM labs are. I do
10:45:55 **17** believe we're -- because of how we've enhanced
10:45:59 **18** the PLM method that we are one of the better
10:46:04 **19** labs because of the time and effort we put into
10:46:06 **20** the analysis. Sort of along the lines of the
10:46:10 **21** proposed PLM method by the FDA in 1973, I think
10:46:14 **22** they said it was laborious.
10:46:16 **23** **Q.** (By Mr. Chachkes) All right. So this is
10:46:17 **24** not a question about what you believe or what people
10:46:19 **25** at MAS believe but a question about what third
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10:46:22 **1** parties believe.
10:46:23 **2** Are there any nationally or
10:46:25 **3** internationally renowned PLM scientists or any
10:46:27 **4** scientists, for that matter, who have identified MAS
10:46:30 **5** as one of the best labs in the world for testing talc
10:46:33 **6** under PLM?
10:46:34 **7** MR. CIRSCH: Object to form.
10:46:35 **8** THE WITNESS: I don't know.
10:46:35 **9** **Q.** (By Mr. Chachkes) Have you ever presented
10:46:37 **10** at any conferences about testing talc by TEM?
10:46:40 **11** **A.** **Maybe. Not cosmetic talcs, no.**
10:46:48 **12** **Q.** Okay. When you say maybe, nothing comes
10:46:51 **13** to mind?
10:46:51 **14** **A.** **Well, we have been analyzing industrial**
10:46:54 **15** **talcs for some time. We have given talks at Johnson**
10:47:00 **16** **Conferences in the past; Mr. Hatfield has. Any of**
10:47:01 **17** **that data that may have happened, I just don't know.**
10:47:05 **18** **Q.** Okay. But for conferences that relate to
10:47:08 **19** testing talc with TEM, sitting here today, you can't
10:47:11 **20** recall presenting at any such conference?
10:47:15 **21** MR. CIRSCH: Object to form.
10:47:17 **22** THE WITNESS: I don't recall.
10:47:17 **23** **Q.** (By Mr. Chachkes) Have you ever presented
10:47:18 **24** at any conference -- sorry, strike that.
10:47:20 **25** Have you ever been invited to present at
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10:47:23 **1** any conferences about testing talc with TEM or PLM?
 10:47:26 **2 A. Yes, I was.**
 10:47:27 **3 Q. Okay. What was that?**
 10:47:28 **4 A. Bruce Bishop invited me to come debate**
 10:47:34 **5 Dr. Sanchez at a DRI conference last year.**
 10:47:37 **6 Q. Okay. So did you actually go to that**
 10:47:38 **7 conference?**
 10:47:38 **8 A. No.**
 10:47:39 **9 Q. And DRI conference, that's a defense bar**
 10:47:42 **10 conference?**
 10:47:42 **11 A. Yes, sir. I have participated in those**
 10:47:45 **12 for a number of times and typically debating one of**
 10:47:49 **13 the defense experts. And he sent an email, and I**
 10:47:56 **14 couldn't arrange it in my schedule.**
 10:47:57 **15 Q. The FDA had a conference in November '18**
 10:48:01 **16 with Jeff San at the University of Maryland; are you**
 10:48:03 **17 aware of that?**
 10:48:04 **18 A. I am.**
 10:48:05 **19 Q. Were you invited to participate?**
 10:48:06 **20 A. No.**
 10:48:06 **21 Q. Are you familiar with Forensic Analytical**
 10:48:10 **22 Labs?**
 10:48:10 **23 A. I am.**
 10:48:11 **24 Q. Would you agree that they are an**
 10:48:13 **25 independent laboratory?**
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10:48:14 **1 MR. CIRSCH: Object to form.**
 10:48:16 **2 THE WITNESS: I don't know what their**
 10:48:17 **3 background is.**
 10:48:19 **4 Q. (By Mr. Chachkes) Okay. Have you relied**
 10:48:20 **5 on their testing of talc for asbestos before?**
 10:48:24 **6 A. I don't know.**
 10:48:25 **7 Q. Sitting here today, is there any reason**
 10:48:29 **8 why you believe you shouldn't be able to rely on**
 10:48:31 **9 their work?**
 10:48:32 **10 MR. CIRSCH: Object to form.**
 10:48:33 **11 THE WITNESS: It depends on the work. I**
 10:48:35 **12 would have to review what work that**
 10:48:37 **13 hypothetically you want me to rely on.**
 10:48:38 **14 Q. (By Mr. Chachkes) Yeah. So I'm just**
 10:48:40 **15 talking about the laboratory, not necessarily the**
 10:48:42 **16 nature of the science, which of course you'll always**
 10:48:46 **17 review; right?**
 10:48:46 **18 So the nature of the laboratory -- and**
 10:48:48 **19 sitting here today, is there anything about the**
 10:48:50 **20 Forensic Analytical Labs laboratory that makes you**
 10:48:54 **21 suspicious of their work in any way?**
 10:48:56 **22 A. I don't have an opinion one way or the**
 10:48:58 **23 other. Typically, for me to say something about any**
 10:49:00 **24 particular lab, I would have to have some interaction**
 10:49:04 **25 with that lab over the years.**
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10:49:07 **1 Q. Now, you issued a supplemental report**
 10:49:10 **2 January 15, 2019; correct?**
 10:49:12 **3 A. Yes, sir.**
 10:49:12 **4 Q. Why? What did it add to or subtract from**
 10:49:17 **5 the first report?**
 10:49:18 **6 A. There was typos in the first report.**
 10:49:21 **7 Also, we talked -- added somewhere, I believe, the**
 10:49:25 **8 Blount PLM that we did on the -- or talked about it**
 10:49:33 **9 on the 16 containers that Lee Poye tested.**
 10:49:39 **10 Q. And those errors that you just referred**
 10:49:43 **11 to, when did you identify them? Was it after you**
 10:49:44 **12 issued your January 15 report -- I'm sorry, after you**
 10:49:47 **13 issued your November 14 report?**
 10:49:49 **14 A. Yes.**
 10:49:49 **15 Q. And how did you identify those errors?**
 10:49:53 **16 A. Reading through it. It was very obvious**
 10:49:58 **17 to me that J3 was not P3, that I had missed it in a**
 10:50:03 **18 couple of places.**
 10:50:04 **19 Q. Okay. So the errors that were identified**
 10:50:05 **20 and fixed in the January 15 report, they were all**
 10:50:08 **21 identified by you personally?**
 10:50:09 **22 A. Either myself or Dr. Rigler. I can't tell**
 10:50:12 **23 you which one of us fixed the most.**
 10:50:15 **24 Q. Okay. And referring to these additional**
 10:50:19 **25 data in the January 15 report, did that testing occur**
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10:50:23 **1 after November 14, 2018?**
 10:50:27 **2 A. Yes. I believe so.**
 10:50:30 **3 Q. And then there's a second supplemental**
 10:50:32 **4 report dated February 1, 2019; correct?**
 10:50:35 **5 A. Correct.**
 10:50:35 **6 Q. Okay. And we discussed that before,**
 10:50:38 **7 didn't we?**
 10:50:38 **8 A. Yes, sir.**
 10:50:39 **9 Q. Do you know why it was not produced until**
 10:50:47 **10 February 2?**
 10:50:48 **11 MR. CIRSCH: Object to form.**
 10:50:52 **12 THE WITNESS: Why it wasn't produced until**
 10:50:54 **13 February 2?**
 10:50:54 **14 Q. (By Mr. Chachkes) Yeah.**
 10:50:55 **15 A. Because that's when I sent it.**
 10:50:56 **16 Q. Okay. You also produced two reports from**
 10:51:04 **17 Lee Poye at J3 Resources dated December 12 and**
 10:51:09 **18 December 21; correct?**
 10:51:10 **19 A. Correct.**
 10:51:10 **20 Q. Can you describe what those reports are?**
 10:51:11 **21 A. XRD of 17 MDL samples -- excuse me -- 19**
 10:51:21 **22 MDL samples to finish off the MDL samples for XRD**
 10:51:26 **23 that we were going to test. We didn't test the**
 10:51:30 **24 Windsor railroad car samples for XRD.**
 10:51:33 **25 Q. And there's some PLM work in there as**
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10:51:35 **1** well?

10:51:37 **2** **A. I don't know.**

10:51:39 **3** **Q.** That's okay. We can get back to that.

10:51:40 **4** Do these samples in Lee Poye's

10:51:47 **5** supplemental reports relate to -- do they correspond

10:51:53 **6** to samples in your report?

10:51:54 **7** **A. Yes.**

10:51:54 **8** **Q.** How did they -- how can somebody correlate

10:51:58 **9** the two?

10:51:59 **10** **A. Let me see. There should have been a --**

10:52:12 **11** **let me get some of this stuff out of the way.**

10:52:15 **12** **Q.** Actually, you know, let's -- here. Let's

10:52:17 **13** go back to 10.

10:52:20 **14** Exhibit 10 is the December 12 letter

10:52:23 **15** from -- this is mine. You've got one in your stack.

10:52:25 **16** **A. Oh, do I?**

10:52:26 **17** **Q.** Yes.

10:52:27 **18** **A. Okay.**

10:52:32 **19** **Q.** Just the coding system, let's just take

10:52:34 **20** the first one. M69722-001, do you see on the front

10:52:40 **21** page?

10:52:40 **22** **A. Yes.**

10:52:40 **23** **Q.** Do you know what that refers to? Does

10:52:42 **24** that coding indicate something to you?

10:52:44 **25** **A. It does. I didn't -- we don't have the**
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10:52:48 **1** **key.**

10:52:48 **2** **What I do is I make an additional number**

10:52:52 **3** **so that the -- Lee Poye essentially gets blind**

10:52:58 **4** **samples, and there's supposed to be a key produced**

10:53:00 **5** **with that.**

10:53:01 **6** **Q.** Okay. You have a key?

10:53:02 **7** **A. I don't have it with me. I thought it was**

10:53:04 **8** **attached to the report.**

10:53:05 **9** MR. CHACHKES: We ask the plaintiffs to

10:53:08 **10** produce that key. I don't think we got it.

10:53:11 **11** MS. O'DELL: Okay.

10:53:15 **12** **Q.** (By Mr. Chachkes) Okay. So have you

10:53:19 **13** produced all the J3 -- all the data J3 Resources

10:53:24 **14** generated from the work for you in this case?

10:53:27 **15** **A. Yes.**

10:53:27 **16** **Q.** And did you ask them about what kind of

10:53:31 **17** materials they generated?

10:53:33 **18** **A. I mean, other than what they sent me, no.**

10:53:38 **19** **Q.** Okay. So you didn't ask them whether

10:53:39 **20** there was additional material that they generated but

10:53:42 **21** just did not provide to you?

10:53:44 **22** **A. No, sir. I have dealt with and had XRD**

10:53:48 **23** **done by them before in other reports, and this is**

10:53:51 **24** **what they provide.**

10:53:52 **25** **Q.** Has anyone at MAS discussed the production
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10:53:56 **1** request in this case with anybody at J3 Resources?

10:53:59 **2** **A. No.**

10:53:59 **3** **Q.** What measures do you employ to ensure that

10:54:02 **4** J3 Resources provides all the data it generated in

10:54:06 **5** its work for you?

10:54:07 **6** MR. CIRSCH: Object to form.

10:54:08 **7** **Q.** (By Mr. Chachkes) Actually, strike that.

10:54:09 **8** I think we have already done that.

10:54:10 **9** All right. Your lab produced something

10:54:11 **10** called global particles tables for a number of

10:54:15 **11** samples. Does that ring a bell?

10:54:16 **12** **A. Yes.**

10:54:16 **13** **Q.** Okay. And what are those?

10:54:21 **14** **A. That's the raw data for each of the**

10:54:24 **15** **particles that were measured and counted.**

10:54:26 **16** **Q.** Okay. And so that's the data underlying

10:54:30 **17** what you report in your expert reports?

10:54:33 **18** MR. CIRSCH: Object to form.

10:54:34 **19** THE WITNESS: Not in this expert report,

10:54:35 **20** I'm not relying on it, but in past ones, yes.

10:54:37 **21** **Q.** (By Mr. Chachkes) Okay. Because those

10:54:38 **22** are non-MDL samples?

10:54:41 **23** **A. Well, they're non-MDL samples. It's not**

10:54:44 **24** **so much they're non-MDL samples, but I was under the**

10:54:48 **25** **impression that these MDL samples weren't contested**
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10:54:51 **1** **for chain of custody.**

10:54:52 **2** **Q.** Okay. But what I'm asking, though, is the

10:54:55 **3** global particle tables that you produced in this case

10:54:58 **4** do not correspond to MDL samples; is that correct?

10:55:03 **5** **A. That is correct.**

10:55:04 **6** **Q.** Okay. Are you able to generate a global

10:55:07 **7** particle table for the MDL samples?

10:55:10 **8** **A. We have not analyzed any MDL samples yet**

10:55:13 **9** **that I'm aware of.**

10:55:13 **10** **Q.** What about the samples in your reports in

10:55:16 **11** this case?

10:55:16 **12** **A. Well, they're not particle size analysis.**

10:55:20 **13** **They're PLM and TEM analysis. Those are specifically**

10:55:25 **14** **designed for detection of amphibole asbestos, not**

10:55:31 **15** **particle sizing.**

10:55:32 **16** **Q.** Why did you produce the global particle

10:55:34 **17** tables in this case?

10:55:35 **18** MR. CIRSCH: Object to form.

10:55:36 **19** THE WITNESS: I was asked for it, you

10:55:39 **20** know, in other cases, so I thought I would just

10:55:41 **21** produce it here, even though I'm not relying on

10:55:43 **22** it.

10:55:46 **23** **Q.** (By Mr. Chachkes) Okay. Do you do talc

10:55:52 **24** particle size analysis for the MDL?

10:55:54 **25** **A. We did not.**
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10:55:55 **1** Q. All right. But the data in the global
10:56:07 **2** particle tables relates to talc particle size?
10:56:12 **3** A. Yes, sir. All the particles for the talc
10:56:15 **4** sizes that -- in the -- I guess it was in August 4,
10:56:22 **5** 2017, or 2018 report, I can't remember.
10:56:24 **6** Q. Sitting here today, are you aware of any
10:56:27 **7** relevance that the global particle tables that you
10:56:30 **8** produced have to the reports you issued in this case,
10:56:33 **9** the MDL?
10:56:35 **10** MR. CIRSCH: Object to form.
10:56:36 **11** THE WITNESS: Again, as I'm stating, I'm
10:56:38 **12** not relying on it. We did not do any MDL
10:56:40 **13** particle sizing. May in the future, but we
10:56:44 **14** haven't done it here, and I'm not relying on the
10:56:46 **15** report that we issued --
10:56:47 **16** Q. (By Mr. Chachkes) Okay.
10:56:49 **17** A. -- in August.
10:56:50 **18** Q. Did your analyst compare any of the
10:56:52 **19** particles identified in your MDL report by PLM to
10:56:59 **20** compare them with a known asbestos reference sample?
10:57:03 **21** MR. CIRSCH: Object to form.
10:57:14 **22** THE WITNESS: I don't know. It's not
10:57:16 **23** something that we typically require analysts to
10:57:19 **24** do, especially the analyst doing this. He's
10:57:23 **25** worked for us for almost 30 years; he's a
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10:57:26 **1** professional geologist; he's probably analyzed
10:57:30 **2** tens and tens and tens of thousands of samples.
10:57:33 **3** He does compare to the appropriate
10:57:38 **4** information --
10:57:43 **5** MR. CIRSCH: Let him finish.
10:57:45 **6** Q. (By Mr. Chachkes) Yeah.
10:57:46 **7** A. So did he pull out standard anthophyllite
10:57:47 **8** tremolite? I would have to check.
10:57:48 **9** Q. So when you say compared to the
10:57:50 **10** appropriate information, you have no knowledge of
10:57:52 **11** what that appropriate information is, do you?
10:57:54 **12** A. Sure I do.
10:57:54 **13** MR. CIRSCH: Object to form.
10:57:56 **14** THE WITNESS: The refractive indices, the
10:58:01 **15** measurement of -- indices, the angle of
10:58:02 **16** extinction, either oblique or parallel, depend
10:58:05 **17** on cross polars, the dispersion staining on the
10:58:08 **18** colors using the Su charts to determine the
10:58:13 **19** refractive indices, the sign of elongation, or
10:58:13 **20** the speed.
10:58:13 **21** Q. (By Mr. Chachkes) So all these --
10:58:14 **22** A. All the standard mineralogical information
10:58:16 **23** that a well-seasoned PLM analyst would do.
10:58:20 **24** Q. So I'm not talking about the data that he
10:58:23 **25** pulls from looking at samples. I'm talking about
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10:58:26 **1** comparing to a reference sample from some source
10:58:30 **2** other than something generated by MAS, are you aware
10:58:33 **3** of any of that?
10:58:34 **4** MR. CIRSCH: Object to form.
10:58:36 **5** THE WITNESS: They have all the references
10:58:38 **6** for all the NIST standards that are routinely
10:58:41 **7** looked at when we get -- when our lab is audited
10:58:47 **8** by the NVLAP, they go around and make sure the
10:58:51 **9** analysts can identify these types of materials.
10:58:53 **10** So, yes, we have reference materials. You
10:58:56 **11** know, did they pull it out or not, as I'm
10:58:59 **12** sitting right here specifically, but they do do
10:59:01 **13** that periodically. So that's all I can tell
10:59:05 **14** you.
10:59:05 **15** Q. (By Mr. Chachkes) Okay. So you have NIST
10:59:07 **16** samples, but you don't know whether your PLM
10:59:09 **17** scientist actually compared the PLM work he did in
10:59:13 **18** this case to those NIST samples for this case?
10:59:18 **19** A. Specifically for these MDL samples did he
10:59:23 **20** pull out the standards or just use the standard
10:59:27 **21** crystallographic information that's specific for the
10:59:31 **22** identification of these types of amphiboles, I'd have
10:59:35 **23** to check.
10:59:36 **24** Q. Okay. So I was asking about the NIST
10:59:38 **25** standard, and you threw in something else. I just
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10:59:41 **1** want to focus on the NIST standard.
10:59:43 **2** Sitting here today you're not aware that
10:59:44 **3** your PLM scientist compared his results on the PLM
10:59:47 **4** for the samples in this case directly to the NIST
10:59:52 **5** sample -- NIST standards; correct?
10:59:55 **6** MR. CIRSCH: Object to form.
10:59:56 **7** THE WITNESS: It's not being aware or not
10:59:57 **8** aware. It's just a question that I can clear up
11:00:01 **9** and ask.
11:00:02 **10** Q. (By Mr. Chachkes) Okay. Did you ask him
11:00:05 **11** at any point?
11:00:07 **12** A. No. I typically don't ask 30-year
11:00:12 **13** seasoned analysts/geologists on any particular
11:00:15 **14** project. But now that you've asked the question,
11:00:18 **15** I'll ask.
11:00:18 **16** Q. Okay. And so you have one analyst doing
11:00:24 **17** all your PLM work for the MDL samples?
11:00:25 **18** A. Yes.
11:00:26 **19** Q. What's his name or her name?
11:00:27 **20** A. Paul Hess.
11:00:29 **21** Q. Spell the last name, please.
11:00:31 **22** A. H-e-s-s.
11:00:32 **23** Q. Your report doesn't state that there were
11:00:38 **24** asbestos reference samples used in the PLM analysis;
11:00:38 **25** correct?
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11:00:43 **1 A. No, sir. It's not the type of information**
11:00:45 **2 I would typically put in a report.**
11:00:47 **3 Q. Do you know which set of NIST standards**
11:00:53 **4 exist at MAS right now?**
11:00:56 **5 A. It is the 1875, I think it is. I have to**
11:01:02 **6 check the numbers on it. It's the standard NIST**
11:01:05 **7 samples that all asbestos labs have or should have.**
11:01:09 **8 Q. Do you know when you obtained them?**
11:01:11 **9 A. Not as I sit here today.**
11:01:13 **10 Q. Did your analyst compare any of the**
11:01:15 **11 particles identified in this report by TEM with any**
11:01:19 **12 known asbestos reference samples?**
11:01:21 **13 A. Well, we have analyzed both reference**
11:01:30 **14 tremolite series, anthophyllite series. We have all**
11:01:33 **15 those reference standards, analytical data on the TEM**
11:01:39 **16 walls. I don't think they pulled the reference and**
11:01:43 **17 put them in each and every time, but they routinely**
11:01:47 **18 check reference samples.**
11:01:49 **19 Q. Okay. So when you say they check**
11:01:51 **20 reference samples, are you saying you mean that they**
11:01:53 **21 check to whatever's on your reference wall?**
11:01:56 **22 MR. CIRSCH: Object to form.**
11:01:57 **23 THE WITNESS: Well, no. The reference**
11:01:58 **24 wall is from the reference samples, and we have**
11:02:01 **25 analyzed reference samples in the past**
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11:02:03 **1 specifically for these J&J cases. And the**
11:02:08 **2 analysts are well trained.**
11:02:10 **3 I don't know how often they need to pull**
11:02:12 **4 out a reference sample in order to identify**
11:02:14 **5 either the anthophyllite solid solution series**
11:02:17 **6 or the tremolite solid solution series.**
11:02:21 **7 Q. (By Mr. Chachkes) Let's ask two different**
11:02:23 **8 lines of questions here.**
11:02:24 **9 So you have internal MAS-generated**
11:02:27 **10 reference samples for TEM to identify asbestos; is**
11:02:30 **11 that correct?**
11:02:30 **12 A. Yes.**
11:02:31 **13 Q. Okay. Did you produce them?**
11:02:34 **14 MR. CIRSCH: Object to form.**
11:02:35 **15 THE WITNESS: I didn't think it was asked.**
11:02:37 **16 MR. CHACHKES: Okay. I would ask the**
11:02:38 **17 plaintiffs produce that, please.**
11:02:40 **18 Q. (By Mr. Chachkes) What about reference**
11:02:42 **19 samples generated by third parties, do you have**
11:02:47 **20 those?**
11:02:49 **21 A. Reference samples by third parties, you**
11:02:51 **22 will have to -- NIST is a third party.**
11:02:53 **23 Q. Okay. So anything else?**
11:02:58 **24 A. We have accumulated reference samples now**
11:03:01 **25 from anthophyllite asbestos from Windsor County, and**
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11:03:09 **1 I'd have to look at them and see what the validation**
11:03:13 **2 is. We have cummingtonite standards now. We have**
11:03:17 **3 grunerite standards. We have -- I believe we have**
11:03:21 **4 winchite and richterite standards. We have not**
11:03:25 **5 analyzed them yet to the degree where we can put the**
11:03:28 **6 results altogether.**
11:03:28 **7 Q. So are these -- so I'm talking about**
11:03:31 **8 reference standards that you can look at those and**
11:03:35 **9 compare to what you're generating in this case. So**
11:03:39 **10 you're saying that there are third-party**
11:03:41 **11 anthophyllite standards that you have that were**
11:03:45 **12 produced by something in Windsor County?**
11:03:48 **13 MR. CIRSCH: Object to form.**
11:03:49 **14 THE WITNESS: It wasn't produced by**
11:03:50 **15 Windsor County. It was a mineral house that**
11:03:57 **16 sells them. And I have not had an opportunity**
11:04:01 **17 to -- we haven't had an opportunity to look at**
11:04:03 **18 them yet.**
11:04:03 **19 Q. (By Mr. Chachkes) That's just the**
11:04:05 **20 mineral, though, right, the raw mineral?**
11:04:07 **21 MR. CIRSCH: Object to form.**
11:04:08 **22 THE WITNESS: Well, it's fibrous, it's raw**
11:04:11 **23 mineral anthophyllite, raw mineral**
11:04:15 **24 cummingtonite, raw mineral grunerite, raw**
11:04:18 **25 mineral winchite-richterite.**
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11:04:22 **1 Q. (By Mr. Chachkes) Okay. For those**
11:04:22 **2 minerals that you just mentioned, did you obtain from**
11:04:24 **3 a third party a TEM photo of the mineral at issue**
11:04:31 **4 that you can use as a standard to compare what you**
11:04:34 **5 find under your TEM?**
11:04:36 **6 MR. CIRSCH: Object to form.**
11:04:38 **7 THE WITNESS: No. Typically people don't**
11:04:39 **8 provide that -- or NIST should have -- a TEM lab**
11:04:43 **9 that's looking at standards should have the**
11:04:46 **10 qualifications and training to be able to**
11:04:49 **11 recognize the regulated asbestos types.**
11:04:52 **12 Q. (By Mr. Chachkes) Okay. So, now, the**
11:04:54 **13 only third-party TEM photographs that you could use**
11:04:59 **14 as a standard for determining whether what you're**
11:05:03 **15 looking at under your TEM is asbestos, the only one**
11:05:06 **16 you've mentioned so far is NIST; correct?**
11:05:09 **17 A. I'm sorry, I misunderstood.**
11:05:10 **18 NIST does not provide you TEM pictures or**
11:05:12 **19 EDS pictures or PLM pictures or any XRD pictures.**
11:05:16 **20 They assume you have the training and capability of**
11:05:19 **21 doing that.**
11:05:19 **22 I'm not aware of any third-party group**
11:05:21 **23 providing photograph standards along with the**
11:05:25 **24 samples.**
11:05:25 **25 Q. Okay. So to sum it all up, you do not**
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11:05:27 **1** have any third-party TEM photos that you use as
11:05:33 **2** standards to compare to what you're seeing under the
11:05:35 **3** TEM?
11:05:36 **4** MR. CIRSCH: Object to form.
11:05:37 **5** THE WITNESS: That's correct. No third
11:05:38 **6** party has sent us TEMs along with their
11:05:41 **7** standards and say here's a standard with a TEM
11:05:44 **8** photo and this is what it all looks like.
11:05:46 **9** **Q.** (By Mr. Chachkes) Your report also does
11:05:47 **10** not state that the analyst used asbestos reference
11:05:52 **11** standards in their TEM analysis; correct?
11:05:55 **12** **A.** That is correct. None of our reports do.
11:05:57 **13** **Q.** How does your lab distribute samples to
11:05:59 **14** individual analysts to test? Is it random? Is it
11:06:02 **15** like some analysts get a certain kind of sample?
11:06:05 **16** **A.** It's random.
11:06:06 **17** **Q.** Is that the same for J3? Did you give
11:06:08 **18** them random samples?
11:06:11 **19** MR. CIRSCH: Object to form.
11:06:13 **20** THE WITNESS: Random samples. For J3 I
11:06:15 **21** specifically gave them the samples that we
11:06:17 **22** wanted XRD done on them.
11:06:18 **23** **Q.** (By Mr. Chachkes) Okay. But for your
11:06:23 **24** individual analyst, nobody's getting like more
11:06:25 **25** Vermont and someone's getting more China, that kind
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11:06:29 **1** of thing?
11:06:29 **2** **A.** Not that I'm aware of.
11:06:30 **3** **Q.** You didn't give any particular analyst
11:06:32 **4** like you're getting more bottles from the '50s and
11:06:36 **5** '60s and someone else is getting something more from
11:06:38 **6** a later era, that's not happening?
11:06:40 **7** **A.** It's fairly random. The analysts don't
11:06:43 **8** have any knowledge of anything more than the sample
11:06:47 **9** number. They don't know if it's China or Vermont
11:06:51 **10** or -- we're not telling them anything other than they
11:06:54 **11** just get a sample number.
11:06:55 **12** **Q.** Who decides which analyst gets which
11:06:58 **13** bottles?
11:06:58 **14** **A.** That's a good question. I guess Victoria
11:07:08 **15** Panariello does.
11:07:08 **16** **Q.** Who is she?
11:07:09 **17** **A.** She is the head person in our TEM lab.
11:07:14 **18** **Q.** Head person meaning administrative?
11:07:18 **19** Scientist?
11:07:18 **20** **A.** She's a scientist.
11:07:19 **21** **Q.** Does she do any analysis herself?
11:07:21 **22** **A.** Occasionally.
11:07:22 **23** **Q.** Under what instrument?
11:07:23 **24** **A.** She's -- she can do both polarized light
11:07:28 **25** microscopy as well as transmission electron
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11:07:30 **1** **microscopy.**
11:07:30 **2** **Q.** Would you expect two analysts from your
11:07:34 **3** laboratory, given splits from the same bottle, to
11:07:38 **4** identify the same asbestos concentration?
11:07:40 **5** **A.** You'll never get an exact asbestos
11:07:50 **6** concentration depending on what level of accessory
11:07:57 **7** amphibole asbestos is in the sample, but I would not
11:08:00 **8** expect the exact same.
11:08:01 **9** **Q.** What level of variation would you think is
11:08:05 **10** so great that you would conclude something went
11:08:08 **11** wrong?
11:08:10 **12** **A.** Don't know. I've not seen that variation
11:08:12 **13** yet for two different samples of the same bottle
11:08:15 **14** that's been analyzed.
11:08:16 **15** **Q.** Okay. Hypothetically, if you split a
11:08:19 **16** bottle and one analyst found no detectable asbestos
11:08:22 **17** and another found half a percent by concentration
11:08:27 **18** asbestos, would you think that was within a
11:08:30 **19** reasonable margin of error?
11:08:33 **20** MR. CIRSCH: Object to form.
11:08:34 **21** THE WITNESS: By TEM?
11:08:35 **22** **Q.** (By Mr. Chachkes) Sure, by TEM.
11:08:37 **23** **A.** At a half a percent?
11:08:39 **24** **Q.** Yeah.
11:08:39 **25** **A.** No, that's not acceptable.
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11:08:41 **1** **Q.** Okay. What about one analyst finding no
11:08:46 **2** detectable asbestos, another finding a quarter of a
11:08:50 **3** percent?
11:08:50 **4** MR. CIRSCH: Object to form.
11:08:51 **5** **Q.** (By Mr. Chachkes) Is that an acceptable
11:08:52 **6** margin of error?
11:08:53 **7** **A.** .25 percent by weight? A quarter percent?
11:08:59 **8** **Q.** No, no. A quarter of a percent.
11:09:02 **9** MR. CIRSCH: Object to form.
11:09:03 **10** THE WITNESS: Isn't that .25? Isn't that
11:09:05 **11** a quarter of a percent?
11:09:09 **12** **Q.** (By Mr. Chachkes) Yeah.
11:09:09 **13** **A.** Sometimes simple math gets the better of
11:09:13 **14** me.
11:09:14 **15** **I would think that would be unacceptable;**
11:09:16 **16** **something has gone wrong.**
11:09:18 **17** **Q.** Just to spare me from the trouble of doing
11:09:20 **18** this all day, at what point would you say, you know,
11:09:23 **19** that's acceptable, and maybe a little larger wouldn't
11:09:26 **20** be acceptable?
11:09:26 **21** MR. CIRSCH: Object to form.
11:09:27 **22** THE WITNESS: I'd have to look at every
11:09:29 **23** situation to see what that percentage is before
11:09:31 **24** I could say what is acceptable and not
11:09:34 **25** acceptable.
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11:09:35 **1** Q. (By Mr. Chachkes) Okay. You have no
11:09:39 **2** written or decided standard in your laboratory for
11:09:42 **3** what kind of error between two analysts is acceptable
11:09:45 **4** or not acceptable, do you?
11:09:47 **5** MR. CIRSCH: Object to form.
11:09:48 **6** THE WITNESS: Yeah, we do. We have
11:09:49 **7** measured where they have gone in and analyzed
11:09:52 **8** the same sample. See, when you were asking for
11:09:53 **9** what's acceptable and not acceptable, it's not
11:09:56 **10** so much on the analyst's side. It could be the
11:09:58 **11** preparation side. It could be a number of
11:10:01 **12** things.
11:10:02 **13** So we have done error rates for the
11:10:06 **14** analyst by TEM analysis where they go in and we
11:10:10 **15** know that in these many grid openings there's
11:10:12 **16** this many fibers, and then we can have them
11:10:15 **17** analyze the same grid openings.
11:10:17 **18** You're taking out the part about the
11:10:19 **19** sample preparation, the filter preparation. So
11:10:22 **20** you have to look at it individually. But for
11:10:24 **21** error rates for the analyst, we have that.
11:10:27 **22** Q. (By Mr. Chachkes) Okay. But just
11:10:29 **23** comparing -- just visually comparing a grid, a single
11:10:32 **24** grid; correct?
11:10:33 **25** MR. CIRSCH: Object to form.
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11:10:35 **1** THE WITNESS: Grid openings --
11:10:35 **2** Q. (By Mr. Chachkes) Yeah.
11:10:36 **3** A. -- where each analyst is told to count the
11:10:39 **4** same grid opening and, therefore, you can determine
11:10:43 **5** what the analyst -- what the coefficient of variation
11:10:48 **6** is.
11:10:49 **7** If you have a sample where -- you take two
11:10:52 **8** samples and one sample is -- they found one fiber in
11:10:54 **9** a hundred grid openings and another sample they found
11:10:57 **10** zero, that's within the -- that's within the margin
11:11:00 **11** of error. That's acceptable.
11:11:02 **12** If you have a sample where one analyst
11:11:04 **13** found 50 fibers and one analyst found none or one,
11:11:10 **14** then something has happened, and you have to go back
11:11:12 **15** and look and go, okay, are the grid openings you
11:11:14 **16** looked at he looked at in the first one. So there is
11:11:17 **17** a process that we have to evaluate all data where we
11:11:22 **18** have multiple samples of the same container.
11:11:24 **19** Q. Sample preparation is extremely important
11:11:27 **20** because that affects the --
21 (Cell phone rings.)
22 Q. (By Mr. Chachkes) Okay. Sample
23 preparation is extremely important because that
11:11:50 **24** affects the outcomes; correct?
11:11:53 **25** MR. CIRSCH: Object to form.
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11:11:54 **1** THE WITNESS: All sample preparation is
11:11:55 **2** important.
11:11:55 **3** Q. (By Mr. Chachkes) And do all your
11:11:56 **4** analysts use the same sample preparation methods?
11:12:01 **5** A. All the people who -- the folks who
11:12:06 **6** prepare the samples use the method that is
11:12:10 **7** appropriate for the analysis that's going to be done.
11:12:13 **8** Q. If there is -- for all the samples that
11:12:18 **9** were analyzed in your report, were they prepared --
11:12:22 **10** the sample preparation, were they all done by the
11:12:25 **11** same method?
11:12:26 **12** A. Yes.
11:12:26 **13** Q. Were they all done by the same person?
11:12:28 **14** A. I would have to look. But yes. Most
11:12:31 **15** likely these samples were all done by the same
11:12:34 **16** person.
11:12:34 **17** Q. Okay. If you took a split from a single
11:12:41 **18** bottle and you had two analysts look at it, would you
11:12:44 **19** expect them to identify the same kinds of asbestos,
11:12:47 **20** assuming there was asbestos spotted?
11:12:49 **21** MR. CIRSCH: Object to form.
11:12:52 **22** THE WITNESS: Not necessarily, no.
11:12:53 **23** Q. (By Mr. Chachkes) Okay. So one could say
11:12:54 **24** I see tremolite and another could say I see
11:12:57 **25** anthophyllite and you don't think that is -- that
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11:13:01 **1** demonstrates a problem?
11:13:03 **2** MR. CIRSCH: Object to form.
11:13:04 **3** THE WITNESS: If the chemistry is right,
11:13:08 **4** the -- and they have identified it correctly,
11:13:11 **5** no. Many of these samples have two types of
11:13:16 **6** asbestos in it.
11:13:16 **7** Q. (By Mr. Chachkes) Okay. Is there any
11:13:22 **8** situation where you think an analyst has identified
11:13:26 **9** an asbestos that you believe maybe there's an error
11:13:30 **10** there?
11:13:32 **11** MR. CIRSCH: Object to form.
11:13:33 **12** THE WITNESS: I haven't run across
11:13:34 **13** anything like that, no.
11:13:35 **14** Q. (By Mr. Chachkes) And if one -- if there
11:13:36 **15** was a split and one analyst said I found -- let's say
11:13:39 **16** there was a split three ways, and one of your
11:13:42 **17** analysts said I found anthophyllite, another analyst
11:13:45 **18** said I found tremolite, and a third analyst said I
11:13:49 **19** found nothing detectable, you would not say maybe
11:13:52 **20** there's a problem here?
11:13:53 **21** MR. CIRSCH: Object to form.
11:13:54 **22** THE WITNESS: Unless I could review the
11:13:55 **23** data and -- you know, it's an interesting
11:13:56 **24** hypothetical. I don't think we have run across
11:13:58 **25** that interesting hypothetical.
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11:13:59 **1** But I would have to review the data to see
11:14:02 **2** what they're analyzing, what the chemistry is,
11:14:05 **3** how did they identify, and how many asbestos
11:14:09 **4** fibers the two that found it versus the one that
11:14:12 **5** didn't. So it's --
11:14:14 **6** **Q.** (By Mr. Chachkes) Okay.
11:14:14 **7** **A.** -- you just can't say is this a problem,
11:14:18 **8** this -- maybe, maybe not.
11:14:20 **9** **Q.** Okay. So there is a situation you would
11:14:22 **10** say there is not a problem where three analysts
11:14:25 **11** looking at the same bottle finding -- one found
11:14:29 **12** anthophyllite, one found tremolite, one found nothing
11:14:31 **13** detectable, there is a situation where that would not
11:14:33 **14** be a problem, you can imagine that?
11:14:35 **15** MR. CIRSCH: Object to form.
11:14:35 **16** THE WITNESS: I don't know if I can
11:14:37 **17** imagine any of this happening, but it's your
11:14:40 **18** hypothetical. Unless I can look at the data and
11:14:44 **19** understand what each of the analysts were
11:14:46 **20** counting, how many structures, what is the
11:14:48 **21** chemistry, what is the diffraction patterns, is
11:14:51 **22** it the two analysts found one and one found
11:14:54 **23** zero, is this -- you know, what is the mine this
11:14:58 **24** is coming from, how does our other data look --
11:15:01 **25** there's a lot involved there than just saying
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11:15:03 **1** off the cuff, oh, that's a problem or that's not
11:15:05 **2** a problem.
11:15:06 **3** **Q.** (By Mr. Chachkes) Okay. All right. I've
11:15:08 **4** asked you whether you can imagine a situation where
11:15:11 **5** that's not a problem. You have not provided that to
11:15:13 **6** me. This is -- I'll just ask it one more time. Can
11:15:16 **7** you provide that to me? I can imagine that's not a
11:15:18 **8** problem.
11:15:18 **9** MR. CIRSCH: Object to form. I think he
11:15:20 **10** answered your question.
11:15:21 **11** THE WITNESS: I can't give you any
11:15:22 **12** additional information about that because I
11:15:25 **13** don't -- as a scientist I just don't like to
11:15:27 **14** say, well, this is -- I can imagine a problem
11:15:30 **15** here, I can't imagine it's a problem, without
11:15:32 **16** looking at any data to see how many asbestos
11:15:34 **17** fibers each of the analysts counted, is it one,
11:15:37 **18** is it ten, is it five, what's the chemistry look
11:15:40 **19** like, the EDXA, the SAED. I would have to
11:15:47 **20** review it to see if it's a problem or not.
11:15:49 **21** **Q.** (By Mr. Chachkes) Is there sufficient
11:15:50 **22** subjectivity in the system such that it could be
11:15:52 **23** correct that one analyst could find in a bottle
11:15:55 **24** tremolite and another analyst could find in the
11:15:57 **25** bottle anthophyllite?
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11:15:58 **1** MR. CIRSCH: Object to form.
11:16:00 **2** THE WITNESS: I don't think it's
11:16:01 **3** subjectivity. I just think it's wherever the
11:16:05 **4** cosmetic talc source was in any particular mine,
11:16:09 **5** what's there. We have many samples that have
11:16:12 **6** both types of asbestos in it.
11:16:14 **7** So you can't say, well, you found this and
11:16:18 **8** the other one found that, when the source, the
11:16:21 **9** accessory -- amphibole asbestos accessory
11:16:23 **10** mineral in these mines have both types.
11:16:26 **11** **Q.** (By Mr. Chachkes) If one of your
11:16:27 **12** scientists looked at a J&J bottle of talc and found a
11:16:32 **13** particular concentration of a particular kind of
11:16:36 **14** asbestos, would you -- do you believe to within a
11:16:42 **15** scientific -- a degree of scientific -- reasonable
11:16:45 **16** scientific degree of certainty that a second
11:16:50 **17** scientist following proper procedures would find the
11:16:52 **18** same?
11:16:52 **19** MR. CIRSCH: Object to form.
11:16:53 **20** THE WITNESS: I think we already talked
11:16:54 **21** about this. I would never expect a second
11:16:56 **22** scientist or a second analyst going in with a
11:16:59 **23** separate prep sample finding the exact amount.
11:17:00 **24** And again, it depends on how many is there.
11:17:03 **25** We did discuss this once. If it's one or
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11:17:05 **1** two and the second analyst found none, that's in
11:17:08 **2** the margin of error, or it's looking for the
11:17:12 **3** needle in the haystack sort of analogy.
11:17:15 **4** If one analyst found 50 and the other
11:17:18 **5** found zero, yes, that's a problem, like we
11:17:19 **6** already discussed. Again, I would have to look
11:17:21 **7** at the data to determine if it's a problem or
11:17:23 **8** not.
11:17:24 **9** **Q.** (By Mr. Chachkes) Do you believe it's
11:17:26 **10** appropriate, given this margin of error, to run
11:17:30 **11** multiple tests on a single bottle and then average
11:17:33 **12** the results to get what would be the correct answer?
11:17:37 **13** MR. CIRSCH: Object to form.
11:17:38 **14** THE WITNESS: I don't think that's
11:17:39 **15** necessary. I think the -- we can accept what
11:17:42 **16** the analysis is. It comes from a sample in a
11:17:45 **17** bottle. The more you run, you may go from
11:17:50 **18** nondetect initially to detect in the second or
11:17:54 **19** third. But I don't think that is necessary to
11:17:56 **20** do for the types of analysis we're doing.
11:17:59 **21** **Q.** (By Mr. Chachkes) For two of your
11:18:02 **22** analysts analyzing the same bottle, what degree of
11:18:06 **23** difference in the detected percentage of fibers
11:18:10 **24** versus detected percentage of bundles would you
11:18:17 **25** expect normally?
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11:18:19 **1** MR. CIRSCH: Object to form.
11:18:20 **2** THE WITNESS: I don't have any
11:18:21 **3** expectations. The analyst is ultimately making
11:18:24 **4** the decision if it is a single fiber or a
11:18:28 **5** bundle. Because he's looking in the microscope,
11:18:31 **6** he's the one who can -- you're looking through
11:18:34 **7** the fiber, he's the one doing the -- he can
11:18:38 **8** change the focal plane, he can change from dark
11:18:42 **9** field to bright field, so ultimately he's making
11:18:44 **10** the decision on it.
11:18:46 **11** Q. (By Mr. Chachkes) I am asking really what
11:18:49 **12** is the margin of error in detecting fiber versus
11:18:53 **13** bundle percentage, acceptable margin of error. Have
11:18:57 **14** you ever figured that out?
11:18:58 **15** A. We haven't done that; it's really not
11:19:00 **16** necessary. It's more important for coefficients of
11:19:04 **17** variation. I've reviewed all the photographs of
11:19:07 **18** fibers and bundles. I would say 95, 98 percent of
11:19:14 **19** them I agree with. There's a couple percent in there
11:19:18 **20** that you have to leave it up to the analyst to make
11:19:21 **21** that decision.
11:19:22 **22** Q. Would you expect an analyst in your lab
11:19:25 **23** and an analyst in Lee Poye's lab to get the same
11:19:29 **24** results for a particular bottle? Is it the same
11:19:32 **25** answer as I've been getting with two analysts in your
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11:19:34 **1** lab?
11:19:34 **2** MR. CIRSCH: Object to form.
11:19:36 **3** THE WITNESS: Yes. I would expect,
11:19:38 **4** depending on what the count is or how many
11:19:41 **5** fibers, if it's not in the margin of error, that
11:19:44 **6** we would verify that it's same bottle as
11:19:47 **7** positive. But other than that, I would have to
11:19:51 **8** see the data to see.
11:19:52 **9** Q. (By Mr. Chachkes) When you say -- when
11:19:55 **10** you say it's not within the margin of error, what's
11:19:58 **11** the quantification of that margin of error?
11:20:00 **12** A. I think our analysts have a margin of
11:20:02 **13** error on coefficient of variation somewhere in the 6
11:20:03 **14** to 7 percent range. So one lab finding one fiber or
11:20:07 **15** maybe two fibers, another lab finding zero or finding
11:20:10 **16** four, I don't have any issue with that.
11:20:14 **17** Q. Would you expect the samples, the various
11:20:23 **18** bottles from a single mine, like all the bottles from
11:20:26 **19** J&J talc from Vermont, cosmetic talc from the Vermont
11:20:31 **20** mine, to have roughly the same EDS spectra?
11:20:36 **21** MR. CIRSCH: Object to form.
11:20:38 **22** THE WITNESS: Depending on the type of
11:20:39 **23** asbestos, yes.
11:20:39 **24** Q. (By Mr. Chachkes) Okay. By the way, I've
11:20:43 **25** seen EDXA; I've seen EDS. Do you use those
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11:20:48 **1** synonymously in your report?
11:20:50 **2** A. I think all ours say EDXA. EDS is old
11:20:54 **3** school. They're both the same technique: energy
11:20:56 **4** dispersive spectroscopy or energy dispersive x-ray
11:21:00 **5** spectroscopy.
11:21:00 **6** Q. Do you expect all the samples from a
11:21:01 **7** single mine, for example, the cosmetic talc from
11:21:08 **8** J&J's Vermont mine, to have similar SAED patterns?
11:21:15 **9** A. Depending on the orientation of the
11:21:18 **10** crystal and depending on what the material is.
11:21:22 **11** Tremolite, winchite, richterite,
11:21:27 **12** actinolite typically have similar, but the
11:21:30 **13** anthophyllite solid solution series, especially from
11:21:34 **14** Vermont where you can have no iron, iron-rich,
11:21:38 **15** cummingtonite, high-iron cummingtonite, and actually
11:21:43 **16** going to grunerite, those will have different
11:21:46 **17** reflections because you're going from orthorhombic to
11:21:49 **18** monoclinic.
11:21:50 **19** Q. So would you expect all the samples from a
11:21:53 **20** single mine to have the same concentration of
11:21:57 **21** asbestos?
11:21:58 **22** A. No.
11:21:59 **23** Q. Why not?
11:22:00 **24** A. Because you're dealing with accessory
11:22:02 **25** minerals. It just depends on where it's being dug
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11:22:07 **1** out of the mine.
11:22:07 **2** Q. Would you expect all the samples from a
11:22:10 **3** single mine to have the same fiber versus bundle
11:22:14 **4** ratio?
11:22:15 **5** A. Not necessarily. All these materials are
11:22:18 **6** milled, and you're dealing with an asbestos type
11:22:21 **7** tremolite-anthophyllite that's brittle. So I don't
11:22:26 **8** know if I would expect to see the same bundles to
11:22:30 **9** fibers.
11:22:30 **10** And of course you're also dealing with the
11:22:33 **11** microscopist who has to make that final decision, the
11:22:36 **12** TEM microscopist, if it's a single fiber or bundle.
11:22:40 **13** What we try to make sure happens is that
11:22:44 **14** every asbestos fiber or bundle we identify meets the
11:22:49 **15** counting criteria for a regulated asbestos fiber or
11:22:53 **16** bundle as per the TEM methods, both ISO, ASTM.
11:22:59 **17** That's the most important thing.
11:23:01 **18** And then we try to also get some
11:23:03 **19** consistency on whether it's bundles or fibers. But
11:23:08 **20** that's what we strive for, is following the protocol,
11:23:12 **21** following the standard counting rules, and
11:23:15 **22** identification.
11:23:16 **23** Q. Hypothetically, if one of your researchers
11:23:21 **24** analyzed 150 different samples from a single mine and
11:23:25 **25** another researcher analyzed those same 150 samples,
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11:23:29 **1** would you expect the averages for both the
11:23:31 **2** researchers to be the same?
11:23:33 **3** MR. CIRSCH: Object to form.
11:23:34 **4** THE WITNESS: I don't know. I'd have
11:23:35 **5** to -- I mean, again, you have to look at the
11:23:37 **6** data and determine what that percentage is for
11:23:41 **7** those exact same samples and what they found
11:23:43 **8** versus the other.
11:23:45 **9** I wouldn't be surprised if they're in the
11:23:47 **10** range of an average or in the range of high to
11:23:49 **11** low. If it's not in that range, then I would
11:23:52 **12** have to look at it to see if it's a problem or
11:23:54 **13** not.
11:24:03 **14** Can we go off the record for a second?
11:24:07 **15** MR. CIRSCH: Sure.
11:24:11 **16** (Recess from 11:24 a.m. to 11:39 a.m.)
11:39:52 **17** **Q.** (By Mr. Chachkes) Dr. Longo, there are
11:40:50 **18** bottles of J&J talc, cosmetic talc, where you've not
11:40:56 **19** detected asbestos; correct?
11:40:58 **20** **A.** That's correct.
11:40:58 **21** **Q.** So for example, there are some bottles of
11:41:02 **22** Vermont sourced J&J talc where you've not detected
11:41:06 **23** asbestos; correct?
11:41:07 **24** **A.** That is correct. The better way to say
11:41:09 **25** that is the asbestos, if present, is below our
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11:41:12 **1** detection limit.
11:41:13 **2** **Q.** Okay. Do you have any opinion as to
11:41:21 **3** whether, if one of those bottles were retested,
11:41:23 **4** whether you would get the same result?
11:41:25 **5** MR. CIRSCH: Object to form.
11:41:27 **6** THE WITNESS: And again, this is -- the
11:41:29 **7** same result is either zero or nondetect below
11:41:33 **8** our detection limit or possibly one right at the
11:41:36 **9** detection limit, and I think we've had samples
11:41:38 **10** like that before.
11:41:40 **11** I think I can think of either Krystal
11:41:45 **12** Kim's two samples and Joanne Anderson's two
11:41:50 **13** samples, I believe one was positive and one was
11:41:53 **14** negative, but they were two different bottles.
11:41:57 **15** Where we have tested the two samples from
11:42:01 **16** the same bottle would be the 1978 historical,
11:42:05 **17** and we found them in both.
11:42:07 **18** **Q.** (By Mr. Chachkes) Okay. I'm not asking
11:42:08 **19** about specific bottles. So listen to the question
11:42:11 **20** I'm asking.
11:42:12 **21** If you had a nondetect on a bottle of J&J
11:42:16 **22** cosmetic talc for asbestos, would you expect,
11:42:21 **23** generally speaking, that if you ran the same test
11:42:23 **24** again, you would get the same result, the non-deduct?
11:42:28 **25** MR. CIRSCH: Object to form.
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11:42:29 **1** THE WITNESS: I don't have any
11:42:30 **2** expectations one way or the other, and I think
11:42:32 **3** we've gone over this. This is the hypothetical
11:42:34 **4** if we analyzed it again, are we going to find
11:42:36 **5** the same thing. It depends on, again, how many
11:42:39 **6** asbestos fibers or bundles were detected the
11:42:41 **7** first time.
11:42:41 **8** If we detect one or two the first time and
11:42:44 **9** do it again and it's zero, that's within the
11:42:46 **10** error rate that you would expect. Or if we
11:42:49 **11** tested again and we find that it's even more,
11:42:53 **12** say three fibers or four fibers.
11:42:56 **13** So you have to look at specifically on
11:42:58 **14** what the first test is, and we're assuming the
11:43:02 **15** first test now is a nondetect, below our
11:43:05 **16** detection limit. And if the second test shows
11:43:07 **17** that there is one or two regulated asbestos
11:43:10 **18** fibers, that wouldn't surprise me.
11:43:12 **19** **Q.** (By Mr. Chachkes) Okay. So let me ask
11:43:15 **20** the question again because you really answered a
11:43:16 **21** different question.
11:43:17 **22** The question is, if you had a bottle of
11:43:19 **23** J&J talc where you had a nondetect. I'm not asking
11:43:23 **24** what your experience is. I'm not asking about a
11:43:25 **25** specific bottle. I'm asking just generally speaking,
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11:43:29 **1** would you expect to have another nondetect if you
11:43:32 **2** were to test it again -- nondetect in the first
11:43:36 **3** instance?
11:43:37 **4** MR. CIRSCH: Object to form.
11:43:38 **5** THE WITNESS: I don't have an expectation
11:43:39 **6** one way or the other. The results are what they
11:43:41 **7** are.
11:43:41 **8** **Q.** (By Mr. Chachkes) Can you make any
11:43:42 **9** assumptions about a bottle of J&J cosmetic talc from
11:43:47 **10** Vermont about the asbestos content without analyzing
11:43:49 **11** the bottle?
11:43:50 **12** **A.** I don't believe you can predict just how
11:43:57 **13** much asbestos is in any particular bottle without
11:44:00 **14** analyzing it.
11:44:02 **15** **Q.** What about the possibility that there's no
11:44:05 **16** asbestos, can you -- if you haven't analyzed a bottle
11:44:10 **17** of J&J talc sourced from Vermont, is it possible that
11:44:15 **18** there's no detectable asbestos?
11:44:18 **19** MR. CIRSCH: Object to form.
11:44:19 **20** THE WITNESS: Again, I don't have
11:44:21 **21** expectations one way or the other. It's either
11:44:25 **22** going to be above, at, or below our detection
11:44:28 **23** limit, depending on the amount of regulated
11:44:30 **24** asbestos that's in that bottle.
11:44:31 **25** **Q.** (By Mr. Chachkes) You're not assuming
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11:44:32 **1** that a nondetect of a J&J bottle of cosmetic talc is
 11:44:38 **2** an incorrect result; correct?
 11:44:40 **3 A. I'm sorry, could you repeat that?**
 11:44:41 **4 Q.** Yeah, I didn't do you a favor there, did
 11:44:44 **5** I?
 11:44:47 **6** You don't believe that a nondetect for
 11:44:49 **7** asbestos on a J&J bottle of cosmetic talc means
 11:44:53 **8** you've made an error?
 11:44:55 **9** MR. CIRSCH: Object to form.
 11:44:56 **10** THE WITNESS: No. It only means that if
 11:44:59 **11** there is regulated asbestos present in that
 11:45:01 **12** bottle, it's below our analytical detection
 11:45:06 **13** limit.
 11:45:07 **14 Q.** (By Mr. Chachkes) Your report includes
 11:45:10 **15** EDXA spectra for several particles; correct?
 11:45:13 **16 A. For --**
 11:45:14 **17** MR. CIRSCH: Object to form.
 11:45:15 **18** THE WITNESS: For several regulated
 11:45:17 **19** asbestos fibers and bundles, yes.
 11:45:19 **20 Q.** (By Mr. Chachkes) Describe how your
 11:45:20 **21** analysts calibrate your EDXA system.
 11:45:25 **22 A. It's calibrated in the QA/QC, I believe,**
 11:45:28 **23 every couple of months where a standard is run and**
 11:45:30 **24 then they make a determination on its count rates.**
 11:45:34 **25 So whatever we have to do for the National Voluntary**
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11:45:42 **1 Laboratory Accreditation Program.**
 11:45:42 **2 Q.** Do you keep that data and results on your
 11:45:46 **3** QA/QC?
 11:45:47 **4 A. Yes.**
 11:45:48 **5 Q.** Have you ever produced it?
 11:45:49 **6 A. No.**
 11:45:52 **7 Q.** How often do they calibrate -- strike
 11:45:57 **8** that.
 11:45:57 **9** Do your analysts compare their EDXA
 11:46:04 **10** spectra to known reference samples, known reference
 11:46:11 **11** spectra?
 11:46:11 **12 A. Yes.**
 11:46:12 **13 Q.** And are those spectra from outside MAS or
 11:46:16 **14** generated within MAS?
 11:46:19 **15** MR. CIRSCH: Object to form.
 11:46:21 **16** THE WITNESS: The reference spectras have
 11:46:24 **17** been generated by MAS.
 11:46:25 **18 Q.** (By Mr. Chachkes) And do your analysts
 11:46:27 **19** compare their EDXA spectra to any third-party
 11:46:34 **20** reference spectra?
 11:46:42 **21 A. Possibly. I mean, there's plenty of**
 11:46:47 **22 publications or book chapters in the past on things**
 11:46:51 **23 like tremolite, richterite, winchite. Not so much on**
 11:46:58 **24 richterite and winchite because it's a mineral that**
 11:47:03 **25 nobody seems to have. We believe we have some now,**
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11:47:05 **1 but we'll have to check it just to determine the**
 11:47:08 **2 sodium concentrations versus the potassium**
 11:47:12 **3 concentrations.**
 11:47:13 **4 Q.** Okay. So sitting here today, you don't
 11:47:14 **5** know whether your analysts compare their EDXA spectra
 11:47:17 **6** to third-party standards?
 11:47:19 **7 A. No, I didn't say that.**
 11:47:20 **8** MR. CIRSCH: Object to form.
 11:47:21 **9** THE WITNESS: We have our own standards,
 11:47:23 **10** we have the NIST standards. And quite frankly,
 11:47:25 **11** a TEM analyst identifying tremolite and
 11:47:28 **12** anthophyllite or iron-rich anthophyllite is
 11:47:33 **13** almost elementary compared to for people with
 11:47:37 **14** analysts with a lot of experience. We have the
 11:47:40 **15** references.
 11:47:43 **16** If you have any particular issue with any
 11:47:45 **17** particular EDXA spectra that you think has been
 11:47:50 **18** misidentified as one of the regulatory asbestos
 11:47:52 **19** types in these reports, I would be happy to look
 11:47:54 **20** at it and we can discuss it.
 11:47:56 **21 Q.** (By Mr. Chachkes) I would like you to
 11:47:57 **22** listen carefully to the question.
 11:47:58 **23** The question is: For the EDXA spectra in
 11:48:04 **24** your report, the conclusions made about which mineral
 11:48:06 **25** that is based on the EDX -- which crystal that is
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11:48:10 **1** based on the EDXA spectra, was that done comparing
 11:48:14 **2** the spectra to a third-party standard?
 11:48:16 **3** MR. CIRSCH: Object to form.
 11:48:17 **4** THE WITNESS: Are you asking a third-party
 11:48:19 **5** standard spectra or a third-party standard
 11:48:23 **6** mineral like NIST?
 11:48:26 **7 Q.** (By Mr. Chachkes) Okay. How about a
 11:48:29 **8** third-party standard, any third-party standard,
 11:48:32 **9** somebody else other than your lab generated this
 11:48:34 **10** spectra, you used that as a standard?
 11:48:36 **11 A. I don't know if we've looked at any other**
 11:48:39 **12 third-party spectra other than what has been -- I**
 11:48:45 **13 think Jim Millette has published in the past. I know**
 11:48:48 **14 we have his stuff. I believe McCrone has also. I**
 11:48:53 **15 have to look in the particle analysis if they've done**
 11:48:56 **16 that. But typically we rely on the actual minerals**
 11:48:59 **17 and the spectras that we've generated in the past**
 11:49:01 **18 from the standards.**
 11:49:02 **19 Q.** So the question isn't about whether
 11:49:04 **20** third-party standards exist. I'm talking about the
 11:49:07 **21** functional day-to-day your analysts doing an EDXA
 11:49:11 **22** spectra. Sitting there, does he look over at some
 11:49:15 **23** third-party document, or does he look at an MAS
 11:49:19 **24** internal document to determine this is what I'm
 11:49:21 **25** looking at?
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11:49:22 **1** MR. CIRSCH: Object to form.
11:49:23 **2** THE WITNESS: I doubt he's looking at when
11:49:25 **3** he takes a spectra of either tremolite series or
11:49:28 **4** anthophyllite series that he's turning over and
11:49:31 **5** looking at a known reference. These analysts
11:49:34 **6** have been doing this for years and years and
11:49:37 **7** years.
11:49:37 **8** We have references, but I can't imagine
11:49:43 **9** every time he takes an EDX spectra that looks
11:49:47 **10** the same time after time after time that he's
11:49:49 **11** looking at a third-party reference at that
11:49:51 **12** particular point in time.
11:49:52 **13** **Q.** (By Mr. Chachkes) Okay. How many
11:49:56 **14** different analysts do you have doing EDXA spectra?
11:49:59 **15** **A. Four.**
11:49:59 **16** **Q.** Does NIST have an EDXA reference spectra
11:50:06 **17** for the various asbestos?
11:50:11 **18** MR. CIRSCH: Object to form.
11:50:12 **19** THE WITNESS: I think you already asked
11:50:14 **20** that. And besides not having a -- providing a
11:50:16 **21** TEM photo, they do not provide an actual
11:50:22 **22** spectra. But I think most -- I think there's a
11:50:26 **23** number of third-party references I believe just
11:50:28 **24** give you the ratios of what you would see in
11:50:31 **25** EDXA for the magnesium, the silicon, the
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11:50:37 **1** calcium, potentially some iron, tremolite, or
11:50:41 **2** actinolite.
11:50:43 **3** **Q.** (By Mr. Chachkes) Why is EDXA useful?
11:50:47 **4** **A. Provides the inorganic, and depending on**
11:50:52 **5 your detector, organic chemistry of any particular**
11:50:56 **6 elongated particulate.**
11:50:58 **7** **Q.** When you look at an EDXA spectra, do you
11:51:03 **8** assume it's a regulated particle and then look to
11:51:07 **9** which regulated particles have the metal-to-silicon
11:51:11 **10** ratio that correspond?
11:51:14 **11** MR. CIRSCH: Object to form.
11:51:15 **12** THE WITNESS: Well, we typically don't do
11:51:18 **13** an EDX spectra unless it meets the definition of
11:51:22 **14** a regulated -- it has the potential for a
11:51:27 **15** regulated asbestos fiber or bundle.
11:51:29 **16** So it's got to be at least .5 micrometers
11:51:33 **17** in length or greater, it's got to have an equal
11:51:36 **18** to -- greater than or equal to 5-to-1 aspect
11:51:41 **19** ratio, and parallel sides. Then the analyst --
11:51:46 **20** first thing I would assume is do EDXA and check
11:51:50 **21** the chemistry. And then SAED.
11:51:55 **22** **Q.** (By Mr. Chachkes) If your analyst sees
11:51:58 **23** something that's, what did you say, greater than .55
11:52:04 **24** millimeters?
11:52:05 **25** **A. Microns.**
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1 **Q.** Microns, I'm sorry.
11:52:06 **2** **A. Micrometers.**
11:52:06 **3** **Q.** Okay. So strike that.
11:52:08 **4** If your analyst sees something that's
11:52:11 **5** greater than .5 micrometers and has an aspect ratio
11:52:14 **6** of at least 5-to-1, then he might do EDXA?
11:52:18 **7** **A. If it has parallel sides, yes. And he may**
11:52:25 **8 do SAED. It doesn't matter which one. But then he**
11:52:29 **9 would have to go through the sequence of determining**
11:52:31 **10 if it meets the definition for the regulated asbestos**
11:52:35 **11 chemistry and the crystalline structure.**
11:52:37 **12** **Q.** Are there minerals that exist in the world
11:52:40 **13** other than regulated particles, regulated asbestos
11:52:44 **14** particles, that are greater than .5 micrometers and
11:52:50 **15** can have an aspect ratio of greater than 5-to-1?
11:52:53 **16** MR. CIRSCH: Object to form.
11:52:54 **17** **Q.** (By Mr. Chachkes) And with parallel
11:52:56 **18** sides?
11:52:56 **19** **A. Yes.**
11:52:56 **20** **Q.** Potentially dozens if not hundreds; right?
11:53:01 **21** **A. I haven't counted them all up. But what**
11:53:04 **22 we potentially see is asbestiform talc bundles or**
11:53:08 **23 fibers all the time. So, yeah, you have to**
11:53:12 **24 distinguish between a talc fiber or bundle and an**
11:53:17 **25 anthophyllite fiber or bundle.**
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11:53:18 **1** **Q.** The question really is about minerals, so
11:53:20 **2** let's focus on what I've just asked, which is: There
11:53:25 **3** are potentially dozens if not hundreds of minerals
11:53:29 **4** that can have parallel sides, that can have -- be
11:53:34 **5** bigger than .5 micrometers, and have aspect ratios
11:53:37 **6** that are 5-to-1 or greater?
11:53:39 **7** MR. CIRSCH: Object to form.
11:53:40 **8** THE WITNESS: And I apologize, but I just
11:53:42 **9** stated I haven't counted them up. And really,
11:53:46 **10** we're not interested in the hundreds or whatever
11:53:47 **11** it is around the world.
11:53:49 **12** It's primarily what do we find in the talc
11:53:55 **13** deposits that are asbestiform or fibrous and
11:54:00 **14** meet those definitions. And typically the only
11:54:04 **15** thing we routinely see is fibrous talc. Every
11:54:10 **16** now and then an antigorite fiber may show up.
11:54:16 **17** But I don't -- to answer your question you
11:54:19 **18** asked, I haven't counted how many are out there.
11:54:21 **19** **Q.** (By Mr. Chachkes) Does MAS conduct
11:54:24 **20** qualitative EDS analysis or quantitative EDS
11:54:27 **21** analysis?
11:54:28 **22** **A. I believe every spectra in here is**
11:54:31 **23 quantitative EDS analysis.**
11:54:33 **24** **Q.** So you actually calculate the peak sizes
11:54:36 **25** and do the math?
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11:54:37 **1 A. We can, but we take the raw data, so that**
 11:54:41 **2 has to have at least 300 seconds of collection. But**
 11:54:46 **3 it's easy to do. You can actually calculate the**
 11:54:51 **4 concentration of the oxides under the peaks. We**
 11:54:54 **5 don't normally do that unless it's necessary.**
 11:54:58 **6 Q. So when you -- just to summarize, when you**
 11:55:07 **7 do identification of mineral by EDXA, you are**
 11:55:13 **8 assuming that it's not any of the potentially dozens**
 11:55:17 **9 or hundreds of other minerals that aren't regulated;**
 11:55:22 **10 correct?**
 11:55:22 **11 MR. CIRSCH: Object to form.**
 11:55:23 **12 THE WITNESS: That's not what I said. I**
 11:55:24 **13 said I didn't know them all. But there's no**
 11:55:27 **14 minerals out there that has all the**
 11:55:29 **15 characteristics of a specific type of a**
 11:55:32 **16 regulated asbestos fiber, and that's why you go**
 11:55:36 **17 through the analytical process.**
 11:55:39 **18 You can get other fibrous materials, but**
 11:55:42 **19 they'll have aluminum or the**
 11:55:47 **20 magnesium-to-silicon ratios are off. But you**
 11:55:50 **21 just don't see that many of these other than**
 11:55:53 **22 fibrous talc.**
 11:55:54 **23 So of course we don't make an assumption**
 11:55:56 **24 what it is. That's why you do the chemistry and**
 11:55:59 **25 the selected area electron diffraction.**

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 11:56:04 **1 Q. (By Mr. Chachkes) How many minerals have**
 11:56:06 **2 the same constituent elements as regulated asbestos?**
 11:56:13 **3 MR. CIRSCH: Object to form.**
 11:56:14 **4 THE WITNESS: Don't know.**
 11:56:14 **5 Q. (By Mr. Chachkes) It could be hundreds?**
 11:56:16 **6 MR. CIRSCH: Object to form.**
 11:56:17 **7 THE WITNESS: It's not a matter if it has**
 11:56:19 **8 the same constituents --**
 11:56:21 **9 Q. (By Mr. Chachkes) My question was --**
 11:56:22 **10 MR. CIRSCH: Hold on. Let him answer the**
 11:56:24 **11 question, please.**
 11:56:25 **12 THE WITNESS: I haven't -- again, I**
 11:56:26 **13 haven't tried to sit down and go through all the**
 11:56:28 **14 minerals in the world that may have magnesium,**
 11:56:31 **15 silicon, or magnesium, silicon, and calcium.**
 11:56:37 **16 What's important is the ratio to the standards**
 11:56:40 **17 to the chemistry to the selected area electron**
 11:56:44 **18 diffraction.**
 11:56:44 **19 MR. CHACHKES: Okay. Let's mark as**
 11:56:45 **20 Exhibit 12.**
 11:56:45 **21 (Defendants' Exhibit 12 was marked for**
 11:56:58 **22 identification.)**
 11:56:58 **23 Q. (By Mr. Chachkes) This is an extracted**
 11:57:00 **24 page from page 132 of your report. Do you recognize**
 11:57:05 **25 this as one of your EDXA spectra?**

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11:57:08 **1 A. I do recognize it.**
 11:57:10 **2 Q. Okay. Now, up at the top it says -- do**
 11:57:13 **3 you see where it says tremolite?**
 11:57:14 **4 A. Yes.**
 11:57:14 **5 Q. You typed that in, right, or your lab**
 11:57:17 **6 typed that in?**
 11:57:19 **7 A. After they identified it, yes.**
 11:57:21 **8 Q. Okay. What's the name of the software you**
 11:57:28 **9 use to generate this spectra?**
 11:57:31 **10 A. You got me there. I don't know the name**
 11:57:33 **11 of the software. It's whatever the EDS system is on**
 11:57:37 **12 this particular one. It's not a light element**
 11:57:39 **13 detector. It comes with the EDXA system. I don't**
 11:57:44 **14 know what they call their software.**
 11:57:46 **15 Q. Do you run the EDXA yourself?**
 11:57:49 **16 A. Not anymore, no.**
 11:57:50 **17 Q. Did you run any EDXA for any of the**
 11:57:53 **18 samples in the MDL?**
 11:58:00 **19 A. No, sir.**
 11:58:00 **20 Q. And walk me through how you determine the**
 11:58:03 **21 chemical composition of a -- what you're looking at**
 11:58:07 **22 from the spectra.**
 11:58:10 **23 MR. CIRSCH: Object to form.**
 11:58:11 **24 THE WITNESS: How far back do you want me**
 11:58:14 **25 to start?**

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 11:58:14 **1 Q. (By Mr. Chachkes) Well, let me ask you**
 11:58:15 **2 this.**
 11:58:16 **3 A. Electrons hit the solid -- electron beam**
 11:58:20 **4 hits the solid with enough energy to eject elements**
 11:58:23 **5 out of their orbital.**
 11:58:23 **6 Q. We're not --**
 11:58:26 **7 A. You don't want me to go back that far?**
 11:58:27 **8 Q. No.**
 11:58:27 **9 A. Okay.**
 11:58:27 **10 Q. So you look at the areas of the peaks;**
 11:58:27 **11 right?**
 11:58:30 **12 A. No, what we -- we look at the peak ratios,**
 11:58:34 **13 the areas -- you can't look at the areas, but the**
 11:58:37 **14 peak ratios is what's important here. This is a**
 11:58:42 **15 typical tremolite with a small amount of iron, so**
 11:58:44 **16 this would not be enough iron to get into the**
 11:58:46 **17 actinolite range. There's no potassium. I don't see**
 11:58:52 **18 much of a sodium peak, so I would call this just**
 11:58:57 **19 tremolite.**
 11:58:57 **20 So the electron beam is put on a spot size**
 11:59:01 **21 onto the bundle or fiber, and the system essentially**
 11:59:04 **22 is turned on and starts collecting x-rays from the**
 11:59:08 **23 different energy levels that are consistent with the**
 11:59:12 **24 different elements.**
 11:59:12 **25 Q. Okay. Let's just focus on you said you**

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11:59:15 **1** look at the ratios of the peaks; right?
 11:59:18 **2** MR. CIRSCH: Object to form.
 11:59:19 **3** **Q.** (By Mr. Chachkes) Am I misstating your
 11:59:21 **4** testimony?
 11:59:21 **5** **A.** **No. I guess I'm trying to understand what**
 11:59:24 **6** **you're asking. Maybe you should repeat the question.**
 11:59:26 **7** **Q.** Okay. You've got a -- I'm not asking how
 11:59:30 **8** the machine works. I'm asking you how you take this
 11:59:33 **9** result in Exhibit 12 and turn that into a conclusion.
 11:59:38 **10** So I'm asking do you look at the ratio of
 11:59:43 **11** the peak heights -- is that one of the things you
 11:59:47 **12** look at?
 11:59:48 **13** **A.** **Yes.**
 11:59:48 **14** **Q.** Okay. What's the ratio you look at
 11:59:49 **15** specifically?
 11:59:51 **16** MR. CIRSCH: Object to form.
 11:59:52 **17** THE WITNESS: You have a magnesium and
 11:59:54 **18** calcium peak that are pretty close. Typically
 11:59:57 **19** the calcium peak can be a little lower.
 11:59:59 **20** If it's a light element detector, the
 12:00:01 **21** magnesium can be a little higher, the silicon
 12:00:05 **22** will be your primary peak, somewhere in the 25
 12:00:09 **23** to 30 percent of the magnesium for a non-light
 12:00:10 **24** element detector. And the calcium peaks and the
 12:00:15 **25** magnesium peaks are usually very similar in
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12:00:17 **1** size.
 12:00:17 **2** And then we look at the amount of iron to
 12:00:20 **3** see if we're going to call it actinolite versus
 12:00:23 **4** tremolite. And not aware of any other minerals
 12:00:27 **5** out there that have those ratios, so that's how
 12:00:34 **6** I call it tremolite.
 12:00:35 **7** **Q.** (By Mr. Chachkes) When you say ratio,
 12:00:36 **8** what are you doing? You're adding, what, the height
 12:00:38 **9** of the metals to -- for the numerator and then on the
 12:00:43 **10** denominator is the height of the silicon peak?
 12:00:47 **11** **A.** **We're looking at the silicon peak versus**
 12:00:49 **12** **the magnesium and the calcium peak, and we're looking**
 12:00:53 **13** **at the magnesium and the calcium peak to determine**
 12:00:56 **14** **if -- how much they line up together. It could be a**
 12:01:00 **15** **little higher, it could be lower, but I would call it**
 12:01:04 **16** **typical tremolite peak.**
 12:01:05 **17** **Q.** And if I --
 12:01:06 **18** **A.** **Tremolite chemistry.**
 12:01:08 **19** **Q.** If I want to go to a third-party source
 12:01:11 **20** that confirms that this is the appropriate way to
 12:01:13 **21** analyze EDXA data, what would you point me to?
 12:01:16 **22** MR. CIRSCH: Object to form.
 12:01:17 **23** THE WITNESS: I'd have to look through the
 12:01:21 **24** protocols, but I believe they give you all the
 12:01:24 **25** ratios and say the AHERA, the ISO. They don't
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12:01:28 **1** give you a peak, but they'll write out what the
 12:01:31 **2** ratio ranges are.
 12:01:33 **3** **Q.** (By Mr. Chachkes) Okay. And those ratios
 12:01:35 **4** are -- are they simply the peak height, or do they
 12:01:37 **5** take into account the peak area?
 12:01:39 **6** **A.** **Well, the peak height and the peak area**
 12:01:43 **7** **are consistent. I mean, the peak area is going to --**
 12:01:50 **8** **the peak height is going to depend on the area,**
 12:01:52 **9** **because as the area of the peak builds up, that's**
 12:01:56 **10** **just more counts.**
 12:01:57 **11** **If you change the chemistry,**
 12:01:59 **12** **hypothetically, of, say, tremolite, you have added**
 12:02:03 **13** **more magnesium elements to it, you're going to have**
 12:02:07 **14** **higher peaks, so they're interrelated.**
 12:02:10 **15** **Q.** Do the standards that you're referring to
 12:02:12 **16** refer to simply peak height or they refer to peak
 12:02:14 **17** area?
 12:02:14 **18** MR. CIRSCH: Object to form.
 12:02:15 **19** THE WITNESS: All the standards in the TEM
 12:02:17 **20** protocols usually typically just give you
 12:02:20 **21** ratios. So I don't -- and if you look in the
 12:02:24 **22** identification, usually they will spell it out,
 12:02:27 **23** like this is the ratio for tremolite, this is
 12:02:29 **24** the ratio for chrysotile, and so on.
 12:02:30 **25** **Q.** (By Mr. Chachkes) My question is the
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12:02:31 **1** ratio of what? Is it ratio of just simply height, or
 12:02:35 **2** is it ratio of peak area?
 12:02:38 **3** **A.** **Peak area and peak height are**
 12:02:40 **4** **interchangeable. It's not -- the peak area, if**
 12:02:44 **5** **you're going to calculate the oxides -- the peak**
 12:02:51 **6** **area -- it's not the peak area.**
 12:02:53 **7** **Let's make it simple. It's not the peak**
 12:02:55 **8** **area. It's the peak height.**
 12:02:57 **9** **Q.** Okay. And that's what the standards say,
 12:02:59 **10** peak height?
 12:03:00 **11** MR. CIRSCH: Object to form.
 12:03:01 **12** THE WITNESS: I believe so.
 12:03:01 **13** **Q.** (By Mr. Chachkes) Okay. And one measures
 12:03:03 **14** that simply -- you just take a ruler and place it
 12:03:06 **15** vertically and you could get a peak height?
 12:03:09 **16** **A.** **Yeah, you could, if you wanted to.**
 12:03:11 **17** **Q.** Okay. Do you actually do that
 12:03:12 **18** quantitatively with numbers, or do you just kind of
 12:03:15 **19** eyeball it?
 12:03:17 **20** MR. CIRSCH: Object to form.
 12:03:18 **21** THE WITNESS: All the analysts would --
 12:03:21 **22** could probably draw that. You know, it's years
 12:03:24 **23** and years' experience. You don't have to take
 12:03:25 **24** the ratios. And if you look at the standards,
 12:03:29 **25** they will look pretty much identical to that.
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12:03:31 **1** But again, you have to be careful if

12:03:33 **2** you're looking at a windowless detector, which

12:03:38 **3** is more sensitive for the different elements.

12:03:39 **4** **Q.** (By Mr. Chachkes) My question is about

12:03:41 **5** what your analysts actually do. Do they actually

12:03:43 **6** quantify the heights and run the numbers, or are they

12:03:46 **7** eyeballing it?

12:03:49 **8** MR. CIRSCH: Object to form.

12:03:49 **9** THE WITNESS: I think at this stage of

12:03:51 **10** their careers they're just visually confirming

12:03:54 **11** the proper elements and the proper ratios.

12:03:56 **12** **Q.** (By Mr. Chachkes) And the software can

12:04:01 **13** generate those numbers; right?

12:04:04 **14** **A.** **The software generates the height? The**

12:04:07 **15 ratios?**

12:04:08 **16** **Q.** Yes.

12:04:08 **17** **A.** **I don't know.**

12:04:09 **18** **Q.** So look at the bottom of Exhibit 12 in the

12:04:12 **19** bottom left. Do you see how it says magnesium,

12:04:19 **20** silicon, calcium, iron, down there on the bottom

12:04:23 **21** left; do you see that?

12:04:23 **22** **A.** Yes.

12:04:24 **23** **Q.** You can print out some -- there's data

12:04:26 **24** that goes there that the software can generate;

25 correct?

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12:04:29 **1** **A.** **That's correct.**

12:04:29 **2** **Q.** Why don't you generate it? Why don't you

12:04:31 **3** generate it?

12:04:32 **4** MR. CIRSCH: Object to form.

12:04:33 **5** THE WITNESS: There's no need to. It's

12:04:35 **6** not required for this type of analysis to

12:04:38 **7** identify tremolite.

12:04:39 **8** **Q.** (By Mr. Chachkes) Do you have that data

12:04:41 **9** somewhere still saved in a machine somewhere?

12:04:44 **10** **A.** **That, I don't know.**

12:04:45 **11** **Q.** Okay. We are going to request that to be

12:04:48 **12** produced. I know your machine generates it. So if

12:04:51 **13** you could see whether you could produce that, we'd

12:04:54 **14** appreciate it.

12:04:55 **15** MS. O'DELL: We'll consider your request.

12:04:58 **16** We're making no commitment we're going to do

12:05:00 **17** that.

12:05:00 **18** MR. CHACHKES: Okay.

12:05:00 **19** **Q.** (By Mr. Chachkes) You don't deliberately

12:05:01 **20** delete that data, do you?

12:05:03 **21** MR. CIRSCH: Object to form.

12:05:04 **22** THE WITNESS: No, sir, I have not

12:05:05 **23** deliberately deleted that data.

12:05:07 **24** **Q.** (By Mr. Chachkes) You don't instruct your

12:05:08 **25** researchers to delete that data, do you?

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12:05:10 **1** MR. CIRSCH: Object to form.

12:05:11 **2** THE WITNESS: No. It's just not -- that

12:05:14 **3** data is just not something I'm relying on for my

12:05:16 **4** opinions in this case.

12:05:17 **5** **Q.** (By Mr. Chachkes) And that data being the

12:05:19 **6** specific numerical representation of the peak

12:05:23 **7** heights?

12:05:23 **8** MR. CIRSCH: Object to form.

12:05:24 **9** THE WITNESS: I believe what that gives

12:05:25 **10** you is the percentage of one element to the

12:05:27 **11** other, not peak heights.

12:05:29 **12** **Q.** (By Mr. Chachkes) You're sure of that?

12:05:31 **13** MR. CIRSCH: Object to form.

12:05:32 **14** THE WITNESS: Pretty sure.

12:05:33 **15** **Q.** (By Mr. Chachkes) Okay. But anyway, you

12:05:37 **16** didn't produce that data in your report, did you?

12:05:39 **17** MR. CIRSCH: Object to form.

12:05:39 **18** THE WITNESS: No, sir. It's not something

12:05:41 **19** that's required to render my opinions in this

12:05:43 **20** case --

12:05:44 **21** **Q.** (By Mr. Chachkes) Okay.

12:05:45 **22** **A.** **-- in this MDL.**

12:05:56 **23** MR. CHACHKES: Let's just mark this as

12:05:57 **24** Exhibit 13.

12:05:58 **25** (Defendants' Exhibit 13 was marked for

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12:06:15 **1** identification.)

12:06:16 **2** **Q.** (By Mr. Chachkes) All right. Look on the

12:06:19 **3** last page of Exhibit 13. There appears to be an EDXA

12:06:23 **4** spectra; do you see that?

12:06:24 **5** **A.** **I do.**

12:06:25 **6** **Q.** And it appears to be generated by the same

12:06:29 **7** software as you're using. All the fonts are the

12:06:31 **8** same; everything appears to be the same. Do you have

12:06:34 **9** any opinion on that?

12:06:34 **10** MR. CIRSCH: Object to form.

12:06:35 **11** THE WITNESS: No.

12:06:35 **12** **Q.** (By Mr. Chachkes) All that information on

12:06:38 **13** the lower left-hand corner in the Exhibit 13, you

12:06:42 **14** could generate that information; right?

12:06:44 **15** MR. CIRSCH: Object to form.

12:06:45 **16** THE WITNESS: I don't know if we have the

12:06:47 **17** same software, same software upgrades, so I

12:06:50 **18** can't comment on that.

12:06:51 **19** **Q.** (By Mr. Chachkes) Can you generate that

12:06:52 **20** information that's down there in the lower left-hand

12:06:55 **21** corner --

12:06:55 **22** MR. CIRSCH: Object to form.

12:06:56 **23** **Q.** (By Mr. Chachkes) -- on Exhibit 13, last

12:06:57 **24** page?

12:06:57 **25** **A.** **And I don't mean to be disrespectful, but**

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12:07:00 **1 I don't know. I don't know if we have the same**
 12:07:02 **2 updated software, et cetera, so I can't say one way**
 12:07:05 **3 or the other.**
 12:07:05 **4 Q.** Do you know whether the data you have from
 12:07:13 **5** your EDXA runs allows you to calculate numerical
 12:07:20 **6** values for the weight percentage of the elements?
 12:07:23 **7 A. I believe I've just already stated I'm**
 12:07:27 **8 not -- I don't know what software system we have and**
 12:07:31 **9 can it do that or not.**
 12:07:32 **10 Q.** Okay. And same question, so whether you
 12:07:35 **11** can generate the standard definitions or atomic
 12:07:39 **12** percentages or all those other ones, you just don't
 12:07:43 **13** know one way or the other whether you can calculate
 12:07:46 **14** those numbers using your EDXA apparatus?
 12:07:50 **15** MR. CIRSCH: Object to form.
 12:07:51 **16** THE WITNESS: It may be possible and we
 12:07:52 **17** may be able to. I just don't know until I ask.
 12:08:01 **18 Q.** (By Mr. Chachkes) Do you know of any
 12:08:06 **19** third-party published source that approves of
 12:08:11 **20** eyeballing EDXA spectra to determine what the
 12:08:14 **21** composition of the material you're looking at?
 12:08:17 **22** MR. CIRSCH: Object to form.
 12:08:17 **23** THE WITNESS: Yes.
 12:08:18 **24 Q.** (By Mr. Chachkes) What?
 12:08:18 **25 A. All the assessors that ever walked in our**
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12:08:25 **1 lab with the National Voluntary Laboratory**
 12:08:26 **2 Accreditation Program do not require anybody to**
 12:08:28 **3 measure peak heights and look at ratios for tremolite**
 12:08:32 **4 or any of these.**
 12:08:35 **5 You may want to make a green analyst who**
 12:08:38 **6 hasn't been doing this for a while do that if he has**
 12:08:41 **7 some issues, but it's not something that I've ever**
 12:08:44 **8 seen the auditors say that is necessary.**
 12:08:46 **9 Q.** Is there any --
 12:08:47 **10** MR. CIRSCH: Did you finish your answer?
 12:08:49 **11** THE WITNESS: Yes.
 12:08:49 **12 Q.** (By Mr. Chachkes) Is there any
 12:08:50 **13** peer-reviewed literature that approves of eyeballing
 12:08:54 **14** EDXA patterns to determine the chemical composition
 12:08:57 **15** you're looking at?
 12:08:58 **16** MR. CIRSCH: Object to form.
 12:08:59 **17 Q.** (By Mr. Chachkes) Peer-reviewed
 12:09:00 **18** literature.
 12:09:00 **19 A. I don't know of any peer-reviewed**
 12:09:02 **20 literature that says that comparing the spectras or**
 12:09:07 **21 looking at the spectras and comparing them should not**
 12:09:10 **22 be done, that you have to use a ruler for every one**
 12:09:13 **23 of them. I'm not aware of any literature that states**
 12:09:15 **24 that, peer-reviewed literature.**
 12:09:16 **25 Q.** Not my question. Any peer-reviewed
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12:09:19 **1** literature that says eyeballing it is okay?
 12:09:22 **2** MR. CIRSCH: Object to form.
 12:09:23 **3** THE WITNESS: I wouldn't put it eyeballing
 12:09:26 **4** comparing to the standards and looking at the
 12:09:28 **5** ratios.
 12:09:29 **6** I'm not aware of any peer-reviewed
 12:09:32 **7** literature that makes that affirmative or
 12:09:34 **8** negative statement one way or the other.
 12:09:36 **9 Q.** (By Mr. Chachkes) But you are aware of
 12:09:37 **10** peer-reviewed literature that uses actual
 12:09:39 **11** quantitative numbers and calculates the kind of
 12:09:43 **12** information we see in Exhibit 13 which is like weight
 12:09:47 **13** percentages; you're aware of that; right?
 12:09:48 **14** MR. CIRSCH: Object to form.
 12:09:50 **15** THE WITNESS: For this type of analysis
 12:09:52 **16** where you're just confirming, I'm not aware of
 12:09:56 **17** any. Maybe there is. Show some if you have
 12:10:01 **18** one.
 12:10:01 **19 Q.** (By Mr. Chachkes) So when you say just
 12:10:03 **20** confirming, you're not using EDXA to determine in a
 12:10:08 **21** vacuum what I'm looking at. You've already made some
 12:10:10 **22** assumptions about what you may be looking at?
 12:10:12 **23 A. No, we never make assumptions. We do the**
 12:10:15 **24 chemistry, and the chemistry is unique. If you go**
 12:10:18 **25 through here -- I was just looking at some. You**
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12:10:19 **1 know, hornblende. Well, there's no aluminum in**
 12:10:23 **2 tremolite. It's fairly straightforward.**
 12:10:26 **3 Q.** Okay. You don't redact the information
 12:10:38 **4** that's in the lower left-hand corner of what's been
 12:10:41 **5** marked as Exhibit 12; right?
 12:10:44 **6 A. No.**
 12:10:44 **7** MR. CIRSCH: Object to form.
 12:10:45 **8 Q.** (By Mr. Chachkes) And you've never
 12:10:46 **9** redacted that information, have you?
 12:10:48 **10** MR. CIRSCH: Object to form.
 12:10:49 **11** THE WITNESS: No.
 12:10:49 **12 Q.** (By Mr. Chachkes) Were they trained not
 12:10:56 **13** to fill in the lower left-hand corner, your analysts?
 12:11:00 **14** MR. CIRSCH: Object to form.
 12:11:01 **15** THE WITNESS: They weren't trained one way
 12:11:02 **16** or the other. It's not required for our
 12:11:04 **17** certifications. NVLAP does not require you to
 12:11:09 **18** run weight percentages, oxides, or any of that.
 12:11:11 **19** You have to demonstrate your ability to identify
 12:11:16 **20** regulated asbestos.
 12:11:19 **21** We've never had it be suggested that we
 12:11:22 **22** are misidentifying tremolite in any
 12:11:26 **23** circumstance.
 12:11:27 **24 Q.** (By Mr. Chachkes) All right. So the
 12:11:38 **25** first step in analyzing an EDXA, though, is to
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12:11:41 **1** determine the ratio of the metals to silicon; right?

12:11:45 **2 A. The first step?**

12:11:46 **3 Q. Yeah.**

12:11:47 **4 A. The first step -- the first step is to**

12:11:50 **5 take the spectra and to verify that it is one of the**

12:11:56 **6 regulated asbestos minerals -- regulated asbestos**

12:12:02 **7 types that is of issue, or any issue, for any of**

12:12:06 **8 them.**

12:12:06 **9 Q. Do you conclude you're looking at a**

12:12:09 **10 regulated asbestos prior to doing the ratio analysis?**

12:12:14 **11 A. No.**

12:12:15 **12 Q. Okay. So prior to determining there's --**

12:12:19 **13 what you're looking at, what kind of mineral you're**

12:12:21 **14 looking at, you determine the ratio of the metals to**

12:12:26 **15 silicon; is that correct?**

12:12:28 **16 A. Before anything is done, we take the**

12:12:30 **17 microchemistry of an individual fiber and look at the**

12:12:34 **18 typical elements that you would expect.**

12:12:38 **19 Q. You seem to not want to answer about the**

12:12:40 **20 EDXA.**

12:12:41 **21 MR. CIRSCH: I don't think he was finished**

12:12:43 **22 answering it.**

12:12:43 **23 Q. (By Mr. Chachkes) All right. I'm talking**

12:12:44 **24 about the EDXA.**

12:12:45 **25 A. That's what I'm saying.**

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12:12:46 **1 Q. So you've got the EDXA result in your**

12:12:50 **2 hands. This result, 12, before you've determined**

12:12:54 **3 what it is, is the first step determining the ratio**

12:12:57 **4 of metals to silicon --**

12:12:59 **5 MR. CIRSCH: Object to form.**

12:13:00 **6 Q. (By Mr. Chachkes) -- to interpret this**

12:13:01 **7 EDXA?**

12:13:02 **8 A. The first step would be to look at this**

12:13:04 **9 EDXA -- and I'm just speaking for me -- and I would**

12:13:07 **10 see that the ratios are consistent with what I would**

12:13:12 **11 expect for tremolite from the standards. That would**

12:13:15 **12 be my first step.**

12:13:17 **13 Q. But you don't know whether those ratios**

12:13:20 **14 are consistent with other minerals as well that are**

12:13:22 **15 non-regulated?**

12:13:25 **16 MR. CIRSCH: Object to form.**

12:13:26 **17 THE WITNESS: I'm not aware of any ratios**

12:13:28 **18 like that for any other non-regulated fibrous**

12:13:31 **19 minerals.**

12:13:33 **20 Q. (By Mr. Chachkes) Are you excluding the**

12:13:34 **21 possibility that they exist, or you're saying you're**

12:13:36 **22 just not aware?**

12:13:37 **23 A. We've never seen them, so I guess I'm**

12:13:41 **24 excluding the possibility that they exist.**

12:13:44 **25 Q. Okay.**

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12:13:45 **1 A. It's hard to prove a negative, but it is**

12:13:48 **2 not one of the look-alikes of that type of ratio**

12:13:52 **3 that's fibrous. And of course we're leaving out the**

12:13:55 **4 SAED to make sure it has an amphibole type**

12:13:59 **5 diffraction pattern.**

12:14:00 **6 Q. Prior to any EDXA, you've already**

12:14:04 **7 determined it's an amphibole?**

12:14:05 **8 A. No. Nothing is determined about this**

12:14:07 **9 particular structure other than it's fibrous, it**

12:14:15 **10 meets the counting criteria for what would be a**

12:14:19 **11 regulated asbestos fiber if in fact the chemistry in**

12:14:23 **12 the crystalline structure are consistent with the**

12:14:27 **13 appropriate mineral.**

12:14:29 **14 Q. Okay. You would agree that two different**

12:14:34 **15 minerals can have similar EDXA readouts; correct?**

12:14:38 **16 MR. CIRSCH: Object to form.**

12:14:39 **17 THE WITNESS: It depends on what you mean**

12:14:40 **18 by similar. I can't answer that hypothetical.**

12:14:46 **19 Q. (By Mr. Chachkes) Okay. So, for example,**

12:14:52 **20 anthophyllite and cummingtonite have similar EDXA**

12:14:56 **21 spectra; correct?**

12:14:57 **22 A. That's correct. Anthophyllite, depending**

12:15:01 **23 on the iron content, anthophyllite, cummingtonite,**

12:15:07 **24 two regulated asbestos types, yes, they can have**

12:15:10 **25 similar EDS.**

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12:15:11 **1 Q. Okay. When you say EDS, you mean the same**

12:15:16 **2 thing as EDXA?**

12:15:18 **3 A. Correct. I'm sorry. I'm old, and that's**

12:15:20 **4 what we learned back in graduate school, it was EDS.**

12:15:24 **5 It's hard for me to go to EDXA.**

12:15:26 **6 Q. All right. So you discussed your first**

12:15:27 **7 step is to make some conclusions about what you're**

12:15:28 **8 looking at just by eyeballing it.**

12:15:30 **9 The next step, do you determine the ratios**

12:15:33 **10 of the metals to the silicon?**

12:15:35 **11 MR. CIRSCH: Object to form.**

12:15:36 **12 THE WITNESS: Well, let's back up here. I**

12:15:38 **13 don't make any conclusions by eyeballing it.**

12:15:41 **14 The first thing we do is look at it and**

12:15:44 **15 say this could match the counting rules for a**

12:15:48 **16 regulated elongated particle.**

12:15:48 **17 It's at least greater than .5 micrometers**

12:15:51 **18 in length. These are measurements. These are**

12:15:53 **19 not eyeballing. It has parallel sides and has**

12:15:56 **20 at least a 5-to-1 aspect ratio or greater.**

12:16:00 **21 Then the EDXA for me is taken to see if it**

12:16:07 **22 is consistent with the ratios and patterns I**

12:16:11 **23 would expect for some -- for the types of**

12:16:13 **24 regulated asbestos fibers we're looking at.**

12:16:15 **25 And we're not saying, okay, we're going to**

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12:16:18 **1** eliminate this type or that type. It's
12:16:21 **2** whatever's present.
12:16:22 **3** Then the SAED -- so it has a typical
12:16:25 **4** amphibole diffraction pattern. If it's
12:16:27 **5** anthophyllite, potentially, we'll rotate the
12:16:30 **6** stage 10 to 20 degrees to eliminate the
12:16:33 **7** once-in-a-blue-moon reflection of a fibrous talc
12:16:37 **8** that some people claim that's close to
12:16:39 **9** anthophyllite.
12:16:40 **10** And after all that, then we would -- I
12:16:43 **11** would say that is a regulated asbestos fiber
12:16:46 **12** type. It meets all the criteria.
12:16:49 **13** You keep saying eyeballing. That's not
12:16:52 **14** really much of a term --
12:16:54 **15** **Q.** (By Mr. Chachkes) My questions are all
12:16:55 **16** about --
12:16:58 **17** MR. CIRSCH: Wait, he's not finished.
12:16:59 **18** THE WITNESS: Wait. I'm not done.
19 MR. CIRSCH: You cut him off.
20 THE REPORTER: Wait. Wait. Wait.
21 THE WITNESS: What we're doing is we're
12:17:01 **22** looking at a set criteria. No decisions are
12:17:02 **23** made ahead of time. Nothing is -- well, I
12:17:07 **24** believe it's that type of thing. That doesn't
12:17:08 **25** happen.
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12:17:08 **1** **Q.** (By Mr. Chachkes) Let's start again. I'm
12:17:10 **2** only asking questions about EDXA.
12:17:12 **3** Can you agree with me not to answer about
12:17:14 **4** TEM or SAED to the following sets of questions? I
12:17:19 **5** just want to know how you do EDXA. Can you do that?
12:17:24 **6** MR. CIRSCH: Object to form.
12:17:25 **7** THE WITNESS: I've already explained that
12:17:26 **8** to you.
12:17:26 **9** **Q.** (By Mr. Chachkes) Okay. But can you
12:17:27 **10** answer these following questions only referring to
12:17:28 **11** EDXA? Can you do me that favor?
12:17:30 **12** **A.** **No.**
12:17:31 **13** **Q.** Okay.
12:17:31 **14** **A.** **If I feel that the question needs more**
12:17:33 **15** **explanation, an answer needs more explanation, I**
12:17:36 **16** **believe that's my right.**
12:17:37 **17** **Q.** Okay. You get the EDXA printout. At what
12:17:40 **18** point, if at all, do you calculate the ratio of
12:17:44 **19** metals to silicon for the EDXA?
12:17:48 **20** MR. CIRSCH: Object to form.
12:17:49 **21** THE WITNESS: I've already gone over that.
12:17:50 **22** I can't say anything more.
12:17:53 **23** If I'm sitting at the TEM, I'm looking at
12:17:56 **24** the monitor and I'm determining -- and the
12:17:59 **25** ratios come up fairly quick. We have them
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12:18:02 **1** tagged for silicon, magnesium, calcium, iron, or
12:18:07 **2** whatever it happens to be, and the ratios are
12:18:09 **3** fairly distinct compared to any other mineral
12:18:11 **4** that I know out there, unless it's winchite or
12:18:15 **5** richterite, and then we're looking at a little
12:18:17 **6** bit of potassium or sodium.
12:18:21 **7** **Q.** (By Mr. Chachkes) Okay. When you say the
12:18:21 **8** ratios come up quick, do you mean a precise number
12:18:23 **9** comes up on some screen?
12:18:24 **10** **A.** **This ratio -- magnesium, silicon, calcium,**
12:18:30 **11** **and iron -- is almost instantaneous. The only thing**
12:18:33 **12** **that changes as you count, they all simultaneously**
12:18:39 **13** **get higher. There is nothing else to it. You look**
12:18:41 **14** **at that, you compare to the regulated standards, and**
12:18:46 **15** **they all match.**
12:18:47 **16** **Q.** Okay. Looking at Exhibit 12, tell me what
12:18:50 **17** the ratios are there.
12:18:54 **18** MR. CIRSCH: Object to form.
12:18:55 **19** THE WITNESS: Say silicon is 10.
12:18:59 **20** Magnesium and calcium is approximately 3. The
12:19:05 **21** iron there would be less than 1.
12:19:08 **22** **Q.** (By Mr. Chachkes) Okay. And that's how
12:19:10 **23** you kind of do it in the real world when you're
12:19:13 **24** analyzing EDXA spectra?
12:19:16 **25** MR. CIRSCH: Object to form.
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12:19:16 **1** THE WITNESS: In the real world we have
12:19:17 **2** standards, and after doing it thousands and
12:19:20 **3** thousands of times, that's how it's done.
12:19:24 **4** **Q.** (By Mr. Chachkes) Okay. Basically the
12:19:25 **5** way you just did it, I'm putting aside that you may
12:19:28 **6** have an encyclopedic knowledge of what to compare the
12:19:31 **7** ratios to. You generate ratios the way you've just
12:19:36 **8** done it, you look at it and you just read it and you
12:19:39 **9** come up with the ratios?
12:19:41 **10** MR. CIRSCH: Object to form.
12:19:42 **11** THE WITNESS: I'm not generating ratios.
12:19:44 **12** The tremolite fiber or bundle is generating the
12:19:47 **13** ratios by the x-rays that are being generated
12:19:51 **14** from the electron beam that are being counted at
12:19:54 **15** specific energies. Those ratios are fairly
12:19:57 **16** standard.
12:19:58 **17** What I do is interpret the overall pattern
12:20:02 **18** and determine how well it matches with the
12:20:04 **19** tremolite standards that are in each of the TEM
12:20:07 **20** rooms.
12:20:07 **21** **Q.** (By Mr. Chachkes) That step in the EDXA
12:20:11 **22** analysis where you determine the ratios, do you do it
12:20:15 **23** in the real world like we just saw now, you look at
12:20:22 **24** the spectra and you say, okay, silicon 10, magnesium,
12:20:24 **25** calcium 3, iron 1-ish, is that how you do it in the
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12:20:26 **1** real world?
 12:20:27 **2** MR. CIRSCH: Object to form.
 12:20:28 **3** THE WITNESS: In the real world I don't --
 12:20:31 **4** I look at the overall pattern, and the overall
 12:20:35 **5** pattern is unique with the -- then it's an
 12:20:39 **6** amphibole asbestos. And that's how every
 12:20:43 **7** asbestos TEM lab in the country does it.
 12:20:45 **8** **Q.** (By Mr. Chachkes) Okay. So does the
 12:20:51 **9** ratios of metal to silicon in the EDXA analysis have
 12:20:57 **10** a material impact on your conclusions about what
 12:21:00 **11** you're looking at?
 12:21:02 **12** MR. CIRSCH: Object to form.
 12:21:03 **13** THE WITNESS: The elemental spectras
 12:21:06 **14** always have a material impact on what I'm
 12:21:08 **15** looking at in the EDXA.
 12:21:10 **16** **Q.** (By Mr. Chachkes) I didn't ask about
 12:21:11 **17** that. I asked about the specific ratio of metals to
 12:21:15 **18** silicon.
 12:21:16 **19** Does that particular numerical ratio have
 12:21:20 **20** a material impact on how you conclude what you're
 12:21:23 **21** looking at under the EDXA?
 12:21:25 **22** MR. CIRSCH: Object to form.
 12:21:26 **23** THE WITNESS: I don't understand the
 12:21:27 **24** question. I think I've answered it over and
 12:21:29 **25** over. I'll answer it one more time.
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12:21:32 **1** **Q.** (By Mr. Chachkes) No, no. I want to make
 12:21:33 **2** sure you understand it.
 12:21:34 **3** Do you understand what I mean by the ratio
 12:21:36 **4** of metals to silicon; do you understand that?
 12:21:39 **5** **A. Yes, sir.**
 12:21:40 **6** **Q.** Okay. Do you calculate that number in
 12:21:45 **7** your head, write it down, print it out? Do you
 12:21:48 **8** calculate that number?
 12:21:50 **9** MR. CIRSCH: Object to form.
 12:21:51 **10** THE WITNESS: I don't know how I do it.
 12:21:56 **11** Tremolite, the ratios to magnesium, silicon, and
 12:22:00 **12** calcium are fairly unique. Not aware of any
 12:22:03 **13** other fibrous materials that will have those
 12:22:06 **14** specific ratios without some other additional
 12:22:08 **15** elements such as aluminum and an amphibole
 12:22:12 **16** diffraction pattern.
 12:22:13 **17** **Q.** (By Mr. Chachkes) Okay. You keep
 12:22:15 **18** answering a different question, but what I heard is
 12:22:16 **19** that you don't calculate the ratio. You actually run
 12:22:20 **20** the numbers and calculate the ratios of metal to
 12:22:23 **21** silicon; is that correct? You don't run that number?
 12:22:25 **22** MR. CIRSCH: Object to form.
 12:22:26 **23** THE WITNESS: I look at -- when I'm doing
 12:22:28 **24** this, I look at every pattern and compare it to
 12:22:32 **25** the standard patterns for those three elements,
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12:22:35 **1** and then the iron depends on if we're going to
 12:22:40 **2** call it actinolite or tremolite. That's how I
 12:22:42 **3** do it.
 12:22:43 **4** **Q.** (By Mr. Chachkes) Okay. Do you calculate
 12:22:44 **5** the ratio of metals to silicon? Do you do that?
 12:22:47 **6** MR. CIRSCH: Object to form.
 12:22:49 **7** THE WITNESS: I think I've told you at
 12:22:53 **8** least a half hour ago that I don't get a ruler
 12:22:56 **9** out and measure each of the primary elements
 12:22:58 **10** we're dealing with here, magnesium, silicon and
 12:23:03 **11** calcium. I look at these distinct patterns,
 12:23:06 **12** EDXA patterns, and can look at that and tell you
 12:23:10 **13** that that is what matches for regulated
 12:23:13 **14** tremolite asbestos.
 12:23:14 **15** **Q.** (By Mr. Chachkes) Okay. Putting aside
 12:23:15 **16** that you don't get a ruler out, do you kind of sort
 12:23:20 **17** of estimate that ratio of metals to silicon in your
 12:23:24 **18** head when you do this analysis?
 12:23:25 **19** MR. CIRSCH: Alex, he's answered this
 12:23:27 **20** question a number of times.
 12:23:28 **21** MR. CHACHKES: No, he said he doesn't take
 12:23:30 **22** out a ruler.
 12:23:31 **23** MR. CIRSCH: A number of different times
 12:23:32 **24** he's testified as to how he does the process.
 12:23:34 **25** I'll let him answer it one more time and then
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12:23:37 **1** I'm going to instruct him not to answer --
 12:23:38 **2** MR. CHACHKES: You're at perfect liberty
 12:23:40 **3** to shut the questions down at any point.
 12:23:41 **4** MR. CIRSCH: I know. I'm going to let him
 12:23:42 **5** do it one more time.
 12:23:42 **6** MR. CHACHKES: Okay.
 12:23:42 **7** **Q.** (By Mr. Chachkes) Do you estimate --
 12:23:42 **8** putting aside whether you use a ruler or not to make
 12:23:45 **9** it exact, do you estimate the ratio of metal to
 12:23:48 **10** silicon in the EDXA spectra?
 12:23:50 **11** **A. For at least the tenth time, and my last**
 12:23:53 **12 time, when I generate a spectra of -- and I'll just**
 12:23:59 **13 call it right now suspected regulated tremolite, I**
 12:24:03 **14 look at the overall pattern for magnesium, silicon,**
 12:24:07 **15 and calcium and determine that it is consistent with**
 12:24:11 **16 the standards, and that's how I make that**
 12:24:14 **17 determination.**
 12:24:14 **18** **Q.** And is that overall pattern that you say
 12:24:16 **19** you look at, is that the ratio of metals to silicon?
 12:24:21 **20** **A. I am not answering this question anymore.**
 12:24:24 **21** MR. CIRSCH: Object to form. That's it.
 12:24:25 **22** **Q.** (By Mr. Chachkes) All right. So you will
 12:24:26 **23** not answer that question?
 12:24:28 **24** **A. I've answered the question I'm estimating**
 12:24:31 **25** **at least ten times.**
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12:24:33 **1** Q. Okay. And you won't come back at some
12:24:36 **2** point and say, yes, indeed, I calculate a number that
12:24:41 **3** is the ratio of metals to silicon. You won't come
12:24:43 **4** back and say that, will you?
12:24:43 **5** MR. CIRSCH: Object to form.
12:24:44 **6** Don't answer the question, Dr. Longo.
12:24:45 **7** Move on, please, Counsel.
12:24:47 **8** Q. (By Mr. Chachkes) Okay. Is the ratio of
12:24:52 **9** metals to silicon for tremolite the same for every
12:24:55 **10** EDXA printout?
12:25:00 **11** A. I think I've already gone over it a couple
12:25:04 **12** of times that depending on your detector, your EDXA
12:25:08 **13** detector, if it is a silicon drifted, lithium drifted
12:25:13 **14** window or windowless detector, these ratios will
12:25:17 **15** change because it's more sensitive.
12:25:19 **16** For example, for chrysotile, even though
12:25:21 **17** there is more magnesium in the formula than silicon,
12:25:28 **18** regular -- with a silicon window you will see less
12:25:32 **19** magnesium. So it just depends on the EDS system.
12:25:38 **20** We have both types. So you could see a
12:25:40 **21** tremolite spectra from the windowless detector that
12:25:45 **22** will look different than the other one as you're
12:25:47 **23** getting ready to pull out.
12:25:48 **24** Q. Are you aware that anthophyllite has a
12:25:51 **25** ratio in the books published to be 7 to 8 for metals
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12:25:56 **1** to silicon? Are you aware of that?
12:25:58 **2** MR. CIRSCH: Object to form.
12:25:58 **3** THE WITNESS: I don't know. I would have
12:25:59 **4** to look at it.
12:26:00 **5** Q. (By Mr. Chachkes) Okay. And you're not
12:26:02 **6** looking to see whether there's a ratio of 7 to 8
12:26:05 **7** metals to silicon, are you?
12:26:07 **8** MR. CIRSCH: Object to form.
12:26:08 **9** THE WITNESS: For anthophyllite, we look
12:26:10 **10** at the EDXA standards, typically the NIST
12:26:16 **11** standards, for that pattern -- I've already told
12:26:18 **12** you I don't get out a ruler and measure these --
12:26:22 **13** that the spectra has to be consistent, and it
12:26:25 **14** has to be for the type of EDXA detector you're
12:26:29 **15** using.
12:26:29 **16** Q. (By Mr. Chachkes) It's a very simple
12:26:31 **17** question. Do you look for a 7 to 8 ratio metals to
12:26:35 **18** silicon --
12:26:35 **19** MR. CIRSCH: Object to form.
12:26:36 **20** THE WITNESS: And it's a very simple
12:26:38 **21** answer. We look at the standard NIST type
12:26:40 **22** spectras that give you the patterns for
12:26:42 **23** potentially anthophyllite or potentially fibrous
12:26:46 **24** talc.
12:26:48 **25** Q. (By Mr. Chachkes) Are you aware that
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12:26:49 **1** tremolite has a published ratio for EDXA metals to
12:26:52 **2** silicon of 5-to-8?
12:26:55 **3** MR. CIRSCH: Object to form.
12:26:55 **4** THE WITNESS: Published where?
12:26:57 **5** MR. CIRSCH: Yeah, will you show him the
12:26:58 **6** document if your --
12:26:59 **7** Q. (By Mr. Chachkes) Are you aware of any
12:27:00 **8** publication that has that?
12:27:01 **9** A. I don't know. Show me the publication and
12:27:03 **10** I'll take a look at it, and I'll have to look at what
12:27:07 **11** conditions this ratio is for what type of detector.
12:27:11 **12** Q. Okay. So sitting here today, you can't
12:27:14 **13** point me to a peer-reviewed publication that has
12:27:17 **14** anything other than a 5-to-8 ratio for tremolite?
12:27:24 **15** MR. CIRSCH: Object to form. You're
12:27:26 **16** holding something in your hand. Why don't you
12:27:28 **17** show --
12:27:28 **18** THE WITNESS: I don't know. I'd have to
12:27:29 **19** look at the publication. We look at the NIST
12:27:31 **20** standards for determining if we have tremolite,
12:27:34 **21** anthophyllite, anthophyllite solid solution
12:27:37 **22** series, the tremolite solid solution series.
12:27:39 **23** Q. (By Mr. Chachkes) Do the NIST standards
12:27:41 **24** have ratios of metals to silicon?
12:27:43 **25** A. The NIST -- as I think we already talked
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12:27:45 **1** about, I don't believe the NIST standards sends you
12:27:47 **2** any information other than this is tremolite or this
12:27:49 **3** is anthophyllite or this is actinolite or this is
12:27:53 **4** crocidolite or this is amosite.
12:27:54 **5** Q. Okay.
12:27:54 **6** MR. CIRSCH: As soon as you get to a good
12:27:56 **7** place, Alex, maybe we can take a lunch break.
12:27:59 **8** MR. CHACHKES: Okay.
12:27:59 **9** Q. (By Mr. Chachkes) Do you know what the
12:27:59 **10** International Mineralogical Association is, the IMA?
12:28:04 **11** A. I don't know.
12:28:06 **12** Q. Okay. Are you aware -- so I guess you
12:28:10 **13** wouldn't be aware they contain a comprehensive list
12:28:14 **14** of minerals in their chemical formulas?
12:28:16 **15** MR. CIRSCH: Object to form.
12:28:17 **16** THE WITNESS: I'm sure they do.
12:28:18 **17** Q. (By Mr. Chachkes) Have you ever looked at
12:28:20 **18** that?
12:28:20 **19** A. I don't know.
12:28:29 **20** Q. Okay. So would you agree with the
12:28:31 **21** statement that talc and anthophyllite have materially
12:28:35 **22** similar chemistries so it can be difficult to
12:28:38 **23** distinguish them on EDXA?
12:28:41 **24** MR. CIRSCH: Object to form.
12:28:42 **25** THE WITNESS: Yes and maybe.
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12:28:45 **1** Q. (By Mr. Chachkes) Okay. What part is
12:28:46 **2** yes?
12:28:47 **3** A. Yes, they have similar chemical makeup.
12:28:50 **4** Q. And maybe they can be difficult to
12:28:52 **5** distinguish on EDXA?
12:28:53 **6** A. Maybe, depending on the chemistry. But we
12:29:00 **7** don't distinguish fibrous talc from anthophyllite by
12:29:05 **8** just EDXA.
12:29:06 **9** Q. Okay. Am I correct that it can be
12:29:09 **10** difficult under EDXA to distinguish anthophyllite
12:29:14 **11** from talc?
12:29:16 **12** MR. CIRSCH: Object to form.
12:29:17 **13** THE WITNESS: I don't know about how
12:29:18 **14** difficult or not difficult. It's not something
12:29:20 **15** we do to distinguish anthophyllite from talc
12:29:22 **16** just on the EDXA other than, okay, it has the
12:29:25 **17** appropriate chemistry.
12:29:28 **18** MR. CHACHKES: Okay. We can take a break
12:29:32 **19** here. Lunchtime.
12:29:33 **20** (Lunch recess from 12:29 p.m. to 1:35 p.m.)
13:36:03 **21** Q. (By Mr. Chachkes) Dr. Longo, you had
13:37:02 **22** mentioned before that you had looked at industrial
13:37:05 **23** talc for asbestos; is that correct?
13:37:06 **24** A. Yes.
13:37:07 **25** Q. And for whom did you do that work?
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13:37:10 **1** A. For whom? Which plaintiffs' attorney?
13:37:13 **2** Q. Sure.
13:37:14 **3** A. I don't recall.
13:37:18 **4** Q. For what client, company, did you do that
13:37:20 **5** work?
13:37:21 **6** A. I haven't done any work for any client
13:37:29 **7** companies that I'm at liberty to talk about for
13:37:38 **8** industrial talc.
13:37:45 **9** Q. Okay. I'm just asking you yes or no, do
13:37:48 **10** you remember the names of the companies or company?
13:37:50 **11** A. I can't talk about any potential work we
13:37:53 **12** may or may not have done for an industrial talc
13:37:56 **13** company.
13:37:56 **14** Q. No, this is just a yes or no. Do you
13:37:58 **15** remember the name? I'm not asking for the name, just
13:38:01 **16** do you remember the name?
13:38:03 **17** A. Again, I'm not saying I have or I haven't.
13:38:06 **18** I'm just not at liberty if I have and if no report
13:38:10 **19** has been issued, at liberty to talk about it.
13:38:13 **20** Q. Okay. You mentioned that you might have
13:38:15 **21** looked at industrial talc for plaintiff lawyers. Was
13:38:18 **22** that recent?
13:38:19 **23** A. I think the most recent one was back in
13:38:21 **24** 2017 for the Kazan firm.
13:38:24 **25** Q. Okay. And you just don't know whether
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13:38:26 **1** that was associated with a particular company?
13:38:30 **2** A. Oh, the company, it was Nytal Vanderbilt
13:38:35 **3** talc.
13:38:35 **4** Q. Okay. But this is plaintiffs' side?
13:38:39 **5** A. Yes, sir.
13:38:39 **6** Q. What about the first time you ever looked
13:38:43 **7** at industrial talc for asbestos, when was that?
13:38:45 **8** A. As I testified earlier, sometime in the
13:38:47 **9** 1990s or early 2000s.
13:38:50 **10** Q. Was that one engagement? Multiple
13:38:56 **11** engagements?
13:38:57 **12** A. I don't recall.
13:38:58 **13** Q. It could be one engagement; you just don't
13:39:00 **14** remember?
13:39:01 **15** A. I'm sure it's more, but I just don't
13:39:02 **16** recall.
13:39:03 **17** Q. Greater than five? Less than five?
13:39:05 **18** A. I don't know what size bread box it is.
13:39:09 **19** Q. Okay. So you've established probably more
13:39:12 **20** than one, but after that you can't say?
13:39:14 **21** A. I just don't recall.
13:39:15 **22** Q. Okay. What about more than one; you can
13:39:17 **23** say it's more than one?
13:39:19 **24** MR. CIRSCH: Object to form.
13:39:20 **25** THE WITNESS: I believe so.
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13:39:21 **1** Q. (By Mr. Chachkes) Okay. And did you
13:39:22 **2** personally do the TEM work on that?
13:39:23 **3** A. Back in those days, probably.
13:39:27 **4** Q. Did you do any -- personally do any PLM
13:39:30 **5** work?
13:39:30 **6** A. No.
13:39:30 **7** Q. Personally do any XRD work?
13:39:32 **8** A. No.
13:39:32 **9** Q. Personally do any EDXA work?
13:39:35 **10** A. Well, when I do TEM for this type of work,
13:39:38 **11** I would have done EDXA.
13:39:40 **12** Q. Okay. Can you estimate in that engagement
13:39:44 **13** or engagements in the 1990s, early 2000s range, how
13:39:49 **14** many hours you would have spent?
13:39:51 **15** A. No.
13:39:52 **16** Q. Could be under ten; could be over ten?
13:39:55 **17** A. I don't recall.
13:39:56 **18** Q. You know who McCrone is; right?
13:39:59 **19** A. I do.
13:40:00 **20** Q. You know they have people there who teach
13:40:02 **21** graduate courses related to detecting asbestos?
13:40:05 **22** MR. CIRSCH: Object to form.
13:40:06 **23** THE WITNESS: I know they have continuing
13:40:10 **24** education courses, yes.
13:40:11 **25** Q. (By Mr. Chachkes) Have you ever taught at
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13:40:12 **1** a graduate school?

13:40:14 **2** **A. Not in this type of work, no.**

13:40:16 **3** **Q.** Okay. In what type of work?

13:40:19 **4** **A. Well, I was visiting assistant professor,**

13:40:21 **5 so it would have been materials science.**

13:40:23 **6** **Q.** Okay. Nothing to do with detecting

13:40:24 **7** asbestos?

13:40:25 **8** **A. No.**

13:40:25 **9** **Q.** Do you know McCrone's Particle Atlas?

13:40:28 **10** **A. Yes.**

13:40:28 **11** **Q.** And that's something folks other than

13:40:31 **12** McCrone use as a standard in this field?

13:40:36 **13** **A. Yes.**

13:40:36 **14** **Q.** Have you ever published anything that

13:40:39 **15** other people outside of your lab use as a standard?

13:40:43 **16** MR. CIRSCH: Object to form.

13:40:45 **17** THE WITNESS: Not in a book, no.

13:40:47 **18** **Q.** (By Mr. Chachkes) What about otherwise?

13:40:50 **19** **A. Yes, if you go to Federal Mogul's and**

13:40:54 **20 search for wollastonite detection, one of our**

13:40:58 **21 protocols was published by them for the determination**

13:41:02 **22 of tremolite asbestos in wollastonite for Federal**

13:41:07 **23 Mogul involving their manufacture of OEM brakes.**

13:41:11 **24** **Q.** What is Federal Mogul? I'm not familiar

13:41:12 **25** with that.

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13:41:12 **1** **A. It's a company that owns a bunch of**

13:41:14 **2 companies.**

13:41:14 **3** **Q.** Okay. So you published -- I'm sorry, say

13:41:20 **4** it again. What does it stand for?

13:41:22 **5** **A. Well, I didn't publish it. We wrote a**

13:41:25 **6 protocol for determining a problem they were having**

13:41:29 **7 with the supplier of a mineral called wollastonite,**

13:41:29 **8 which is a substitute fibrous material, and the**

13:41:31 **9 particular source that they were using stated that it**

13:41:36 **10 had a small amount of tremolite contamination in it.**

13:41:38 **11** **Q.** Okay. Did you ever published a standard

13:41:40 **12** for finding asbestos that was for the general

13:41:44 **13** scientific community, not for just one specific

13:41:49 **14** client?

13:41:49 **15** MR. CIRSCH: Object to form.

13:41:50 **16** THE WITNESS: I was in charge of the ASTM

13:41:52 **17** and the D2205 committee for the analysis of --

13:41:57 **18** number count analysis of asbestos in settled

13:42:01 **19** dust. It's the D5755, I believe it is.

13:42:05 **20** **Q.** (By Mr. Chachkes) Okay. And that has

13:42:08 **21** your name on it?

13:42:09 **22** **A. No. ASTM standards have ASTM on it.**

13:42:13 **23** **Q.** Okay. And that was -- that standard --

13:42:16 **24** the contributors were many more people than you;

25 right?

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13:42:19 **1** **A. Yes. Some people contributed, but I was**

13:42:22 **2 in charge of -- it was our method that we had given**

13:42:25 **3 to the EPA. Then it was fighting over the**

13:42:30 **4 definitions.**

13:42:31 **5** **Q.** Have you or MAS published any standard for

13:42:35 **6** finding asbestos in any material or any mineral or

13:42:39 **7** anywhere that is attributable exclusively to you or

13:42:43 **8** MAS?

13:42:43 **9** **A. No.**

13:42:44 **10** **Q.** Have you published a methodology for

13:42:55 **11** finding asbestos in talc?

13:42:57 **12** **A. Have not.**

13:42:59 **13** **Q.** You're aware that McCrone has done that;

13:43:01 **14** right?

13:43:01 **15** MR. CIRSCH: Object to form.

13:43:02 **16** THE WITNESS: Jim Millette, yes, I'm

13:43:05 **17** aware, 1990 and 2015, I believe, are the two

13:43:09 **18** papers in Microscopy.

13:43:10 **19** **Q.** (By Mr. Chachkes) You're aware that

13:43:11 **20** McCrone has testing and training classes related to

13:43:14 **21** finding asbestos; correct?

13:43:15 **22** MR. CIRSCH: Object to form.

13:43:16 **23** THE WITNESS: They teach a -- used to,

13:43:19 **24** anyway, the McCrone Institute. May still do it.

13:43:25 **25** **Q.** (By Mr. Chachkes) Have you ever taught or

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13:43:30 **1** trained -- sponsored teaching or training classes for

13:43:34 **2** finding asbestos for people outside of MAS?

13:43:36 **3** **A. I've given a couple lectures and taught an**

13:43:39 **4 all-day two-day seminar at the American Industrial**

13:43:44 **5 Hygiene Association to help train, to give certified**

13:43:48 **6 industrial hygienists or industrial hygienists how to**

13:43:51 **7 perform TEM analysis for asbestos.**

13:43:54 **8** **Q.** Okay. Other than that, any?

13:43:57 **9** **A. At Georgia Tech in their continuing**

13:44:00 **10 education program involving asbestos, seminar up at**

13:44:08 **11 Southern University of New York, I have taught there**

13:44:13 **12 for a week. Again, it was TEM analysis for asbestos.**

13:44:19 **13** **Q.** Okay. Was it for finding talc, asbestos

13:44:24 **14** in talc?

13:44:25 **15** **A. No, it was just general finding asbestos**

13:44:28 **16 in whatever you wanted to look in.**

13:44:30 **17** **Q.** Have you or MAS given any training or

13:44:36 **18** classes relating to finding asbestos in talc?

13:44:39 **19** **A. No.**

13:44:39 **20** **Q.** Has any School of Public Health asked you

13:44:43 **21** to assist them in finding asbestos in talc?

13:44:46 **22** **A. No.**

13:44:47 **23** **Q.** You're aware that a number of governmental

13:44:51 **24** bodies are out there, not just in the U.S. but

13:44:54 **25** elsewhere, looking into the question of whether

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13:44:58 **1** asbestos is in cosmetic talc; correct?
13:45:01 **2** MR. CIRSCH: Object to form.
13:45:02 **3** THE WITNESS: I'm aware of Canada and
13:45:06 **4** maybe India, maybe. I've seen some articles.
13:45:07 **5** **Q.** (By Mr. Chachkes) Okay. Have any of
13:45:07 **6** those -- any governmental body, U.S. or otherwise,
13:45:10 **7** asked you to assist in determining whether cosmetic
13:45:13 **8** talc has asbestos?
13:45:15 **9** MR. CIRSCH: Object to form.
13:45:16 **10** THE WITNESS: No.
13:45:18 **11** **Q.** (By Mr. Chachkes) Has any federal court
13:45:20 **12** ever said that your methodology for finding talc
13:45:23 **13** in -- asbestos in talc passes Daubert standards?
13:45:30 **14** **A.** **I'm not sure I've had a Daubert standard**
13:45:32 **15** **in federal court yet. As for state court, I think**
13:45:36 **16** **there's been seven, six or seven challenges.**
13:45:39 **17** **Q.** So my question is about federal court.
13:45:41 **18** Has any federal court certified you under Daubert
13:45:43 **19** standards for finding asbestos in talc?
13:45:45 **20** MR. CIRSCH: Object to form.
13:45:46 **21** THE WITNESS: As I just stated, I don't
13:45:48 **22** believe I've been in federal court yet other
13:45:50 **23** than this one for -- where any Daubert
13:45:56 **24** challenges would arise.
13:45:57 **25** **Q.** (By Mr. Chachkes) Has your methodology
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13:45:59 **1** for finding asbestos in talc ever been published in a
13:46:04 **2** peer-review journal or literature otherwise?
13:46:05 **3** MR. CIRSCH: Object to form.
13:46:06 **4** THE WITNESS: Well, it's not my method,
13:46:08 **5** and the Blount method by PLM has been published
13:46:13 **6** and the ISO 22262-2 is an international
13:46:16 **7** standard. So it's not my method; it's standard
13:46:20 **8** protocols for doing the method.
13:46:21 **9** **Q.** (By Mr. Chachkes) Is all your analysis
13:46:23 **10** for -- all your analysis of cosmetic talc for
13:46:27 **11** asbestos been for and sponsored by plaintiffs'
13:46:30 **12** lawyers?
13:46:31 **13** **A.** **Yes.**
13:46:31 **14** **Q.** You mentioned the NVLA. What is that?
13:46:36 **15** **A.** **National Voluntary Laboratory**
13:46:41 **16** **Accreditation Program for the determination of**
13:46:42 **17** **asbestos in air samples by TEM and bulk analysis.**
13:46:47 **18** **Q.** Does the NVLA have an accreditation for
13:46:52 **19** finding asbestos in talc?
13:46:54 **20** **A.** **It's hard to say because they don't really**
13:47:01 **21** **dictate what the matrix is.**
13:47:04 **22** **Q.** When you say matrix, what do you mean by
13:47:06 **23** that?
13:47:06 **24** **A.** **Well, it's just asbestos in materials.**
13:47:09 **25** **I'm not sure they have a specific one for talc or a**
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13:47:13 **1** **specific one for joint compound or a specific one for**
13:47:17 **2** **thermal insulation. It's just a matter of being able**
13:47:23 **3** **to determine and detect and to record what is**
13:47:27 **4** **present.**
13:47:28 **5** **Q.** Okay. Does the NVLA have an accreditation
13:47:33 **6** standard for finding talc in something other than
13:47:36 **7** air, like in -- I'm sorry, strike that.
13:47:37 **8** Does the NVLA have an accreditation
13:47:41 **9** standard for finding asbestos in something other than
13:47:43 **10** air, like in talc?
13:47:44 **11** MR. CIRSCH: Object to form.
13:47:45 **12** THE WITNESS: Well, they accredited to the
13:47:48 **13** EPA 600/R-93 PLM method. That's not specific
13:47:53 **14** for talc. It's building materials.
13:47:56 **15** **Q.** (By Mr. Chachkes) And do they accredit
13:47:58 **16** you for methodology or something else?
13:48:01 **17** **A.** **To be able to perform the analysis.**
13:48:04 **18** **Q.** Meaning what?
13:48:06 **19** **A.** **Meaning if you -- we have round-robins**
13:48:10 **20** **that you can adequately identify products that have a**
13:48:14 **21** **certain concentration of asbestos in it that you**
13:48:16 **22** **would routinely see for building products.**
13:48:18 **23** **Q.** Has NVLA ever accredited you specifically
13:48:21 **24** for finding talc in asbestos?
13:48:24 **25** **A.** **I think, as I've already stated, they**
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13:48:26 **1** **don't have a previous matrix, meaning what is the**
13:48:29 **2** **asbestos in. They go by the EPA 600/R-93 method for**
13:48:36 **3** **analysis of bulk samples, typically building material**
13:48:40 **4** **bulk samples for asbestos.**
13:48:41 **5** **Q.** So the NVLA, did they actually have
13:48:44 **6** someone come to your lab and do this accreditation?
13:48:46 **7** **A.** **Yes.**
13:48:46 **8** **Q.** Okay. When that person came to your lab
13:48:47 **9** for the accreditation, did they ask to see your
13:48:51 **10** techniques and methodologies for finding asbestos in
13:48:53 **11** talc?
13:48:54 **12** MR. CIRSCH: Object to form.
13:48:55 **13** THE WITNESS: Again, they don't say talc
13:48:57 **14** and they don't say any particular thing. It's
13:48:58 **15** just your overall methodology for performing the
13:49:01 **16** analysis. And usually the auditor will bring
13:49:07 **17** samples and have the analyst be able to
13:49:10 **18** determine the type and the estimated weight
13:49:14 **19** percent of what's in the sample.
13:49:15 **20** **Q.** (By Mr. Chachkes) Okay. So the samples
13:49:18 **21** that the NVLA brought for you to analyze for your
13:49:22 **22** accreditation were not talc samples; correct?
13:49:25 **23** **A.** **I don't believe so, no.**
13:49:25 **24** **Q.** They were just straight-up samples of
13:49:28 **25** different kinds of asbestos; right?
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13:49:30 **1** **A.** **In some building material.**

13:49:32 **2** **Q.** Okay. Is the NVLA accreditation standard

13:49:38 **3** public?

13:49:39 **4** **A.** **When you -- I don't understand what you**

13:49:40 **5** **mean.**

13:49:40 **6** **Q.** Obviously, they must have some standard

13:49:42 **7** that they're comparing you to. Is that written down,

13:49:44 **8** or is it just in the minds of the NVLA?

13:49:49 **9** MR. CIRSCH: Form.

13:49:50 **10** THE WITNESS: I mean, there is a set this

13:49:50 **11** is what you have to do and be able to do, plus

13:49:54 **12** the PAT rounds that's sent out by the Research

13:50:02 **13** Triangle Institute where they send samples out,

13:50:05 **14** your analysts have to analyze them and send them

13:50:08 **15** in, and they compare to see if you pass or fail.

13:50:10 **16** **Q.** (By Mr. Chachkes) Okay. My question was

13:50:14 **17** do they have published standards?

13:50:16 **18** MR. CIRSCH: Object to form.

13:50:17 **19** **Q.** (By Mr. Chachkes) Something written down

13:50:17 **20** where I can look at it and read on the page, ah, this

13:50:20 **21** is how they accredit me?

13:50:22 **22** MR. CIRSCH: Object to form.

13:50:23 **23** THE WITNESS: I think you can go to the

13:50:24 **24** NIST website for this type of -- and download

13:50:29 **25** it. I'm sure it's public.

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13:50:32 **1** **Q.** (By Mr. Chachkes) Now, you've run NIST

13:50:36 **2** standards for EDSA; correct?

13:50:39 **3** **A.** **Correct.**

13:50:39 **4** **Q.** How often do you run those?

13:50:43 **5** **A.** **I think you asked me earlier. I don't**

13:50:45 **6** **recall. I brought some here because since we were**

13:50:48 **7** **looking at the EDXA or talking about EDXA of**

13:50:53 **8** **tremolite, it's in my reliance documents where we**

13:50:56 **9** **measured the EDXA on 200 tremolite fibers and bundles**

13:51:02 **10** **showing you the, quote, pattern.**

13:51:06 **11** **Q.** I'm sorry, you're talking about the NIST

13:51:08 **12** standard right now?

13:51:08 **13** **A.** **Yes.**

13:51:09 **14** **Q.** Okay. So you analyzed 200 NIST standards?

13:51:11 **15** **A.** **Well, 200 particles in a NIST standard.**

13:51:13 **16** **Q.** Okay. So you've at least done one NIST

13:51:16 **17** standard. Have you done more than one NIST standard?

13:51:19 **18** **A.** **We have analyzed all the NIST standards to**

13:51:26 **19** **generate standards of EDXA.**

13:51:29 **20** **Q.** Same for SAED?

13:51:31 **21** **A.** **Yes.**

13:51:32 **22** **Q.** Same for TEM?

13:51:35 **23** **A.** **Well, TEM would be EDXA and SAED.**

13:51:39 **24** **Q.** Okay. And do you keep those materials,

13:51:45 **25** the standards you run?

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13:51:46 **1** **A.** **I believe so.**

13:51:47 **2** **Q.** Okay. And you said you brought something.

13:51:49 **3** What did you bring?

13:51:50 **4** **A.** **Well, I brought the EDXA on 200 tremolite**

13:51:55 **5** **fibers and bundles that was done, the 1867.**

13:52:01 **6** **Q.** Oh, I'm sorry, so this is something you've

13:52:04 **7** already produced; you just brought it -- also brought

13:52:05 **8** it?

13:52:06 **9** **A.** **Yes.**

13:52:06 **10** **Q.** Okay.

13:52:06 **11** **A.** **I mean, it's in my reliance documents, and**

13:52:08 **12** **it can give you a -- if you look at the ratios,**

13:52:14 **13** **they're pretty much identical to what you were**

13:52:16 **14** **showing me here.**

13:52:17 **15** **Q.** Okay. And did you bring any other

13:52:25 **16** documents that haven't been produced?

13:52:27 **17** Did you bring any documents that haven't

13:52:28 **18** been produced?

13:52:29 **19** **A.** **Well, these have been produced.**

13:52:31 **20** **Q.** Right. So I'm asking separate and apart

13:52:33 **21** from that.

13:52:33 **22** **A.** **Oh.**

13:52:34 **23** **Q.** Did you bring any documents today that

13:52:35 **24** haven't been produced?

13:52:36 **25** **A.** **No.**

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13:52:36 **1** **Q.** Okay. So those are your NIST samples for

13:52:45 **2** EDXA; right?

13:52:47 **3** **A.** **Right. We were looking at the**

13:52:48 **4** **Addison-Davies method to see if boiling the acid --**

13:52:52 **5** **boiling the tremolite in sulfuric acid for an hour**

13:52:56 **6** **and then boiling it in sodium hydroxide for an hour,**

13:53:00 **7** **did it change any chemical component or size**

13:53:03 **8** **distribution of the NIST standard.**

13:53:05 **9** **Q.** Did you produce your NIST standard

13:53:07 **10** analysis for TEM?

13:53:11 **11** **A.** **That is TEM.**

13:53:11 **12** **Q.** Okay. All right. For what about PLM, did

13:53:15 **13** you produce those?

13:53:16 **14** **A.** **No.**

13:53:16 **15** MR. CIRSCH: Object to form.

13:53:18 **16** THE WITNESS: You typically -- since it's

13:53:21 **17** almost 100 percent tremolite, it's not usually a

13:53:23 **18** standard that you develop for PLM. You can look

13:53:25 **19** at it and check your refractive indices and make

13:53:30 **20** sure -- the oblique extinction, et cetera, but

13:53:34 **21** you don't usually just run those.

13:53:36 **22** **Q.** (By Mr. Chachkes) Okay. So when you say

13:53:37 **23** you don't usually, you did not run NIST standards for

13:53:40 **24** PLM; is that what I'm hearing?

13:53:42 **25** **A.** **I don't know if we have. I don't believe**

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13:53:44 **1** so.
13:53:44 **2** **Q.** Okay. If you did, would you have kept the
13:53:47 **3** material?
13:53:48 **4** MR. CIRSCH: Object to form.
13:53:49 **5** THE WITNESS: I don't know.
13:53:50 **6** **Q.** (By Mr. Chachkes) Okay. We would ask any
13:53:51 **7** of that material be produced.
13:53:54 **8** Any other NIST standards that you ran
13:53:57 **9** under any other instruments that we haven't talked
13:53:59 **10** about?
13:53:59 **11** **A.** No.
13:54:14 **12** MS. TROVATO: I'm sorry, I have Exhibit 10
13:54:15 **13** to this deposition --
13:54:16 **14** MR. CIRSCH: That's been marked at a
13:54:18 **15** previous deposition.
13:54:18 **16** THE WITNESS: That was marked on 3/21.
13:54:18 **17** MS. TROVATO: I want to mark it here.
13:54:21 **18** MR. CHACHKES: Okay. Can we mark this as
13:54:22 **19** Exhibit 14.
13:54:24 **20** (Defendants' Exhibit 14 was marked for
13:54:33 **21** identification.)
13:54:33 **22** **Q.** (By Mr. Chachkes) Okay. So Exhibit 14 is
13:54:34 **23** what you were just referring to as the -- you ran a
13:54:37 **24** NIST standard and the Addison-Davies technique,
13:54:39 **25** that's 14; right?
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13:54:40 **1** **A.** Yes, sir.
13:54:40 **2** **Q.** Okay. Looking back at -- can you go back
13:54:46 **3** to Exhibit 12, which is the EDXA spectrum.
13:54:54 **4** If I handed this to a very experienced
13:55:00 **5** EDXA scientist, as experienced as you want, and I
13:55:06 **6** gave him no context where it came from, you know,
13:55:12 **7** anything other than just this printout, would they
13:55:14 **8** identify this as tremolite and only tremolite?
13:55:17 **9** MR. CIRSCH: Object to form.
13:55:18 **10** THE WITNESS: I can't opine about what
13:55:20 **11** other people would do. If I looked at this, my
13:55:24 **12** reaction would be that looks like tremolite.
13:55:27 **13** **Q.** (By Mr. Chachkes) Okay. I'm not talking
13:55:28 **14** about you. Again, this is about the question of what
13:55:32 **15** a third-party would and how they would interpret
13:55:37 **16** this.
13:55:37 **17** Would somebody who is a very experienced
13:55:39 **18** EDSA scientist look at this spectra and say I know
13:55:47 **19** what this is, this is tremolite? Or are there other
13:55:50 **20** minerals that are consistent with this?
13:55:53 **21** MR. CIRSCH: Object to form.
13:55:54 **22** THE WITNESS: I can't speculate on what
13:55:55 **23** other experienced TEM folks would do. I can
13:55:58 **24** just tell you, since I'm sitting here, that I
13:56:02 **25** would say that's probably tremolite.
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13:56:04 **1** **Q.** (By Mr. Chachkes) Okay. Again, I know
13:56:05 **2** what you think. So these questions aren't about what
13:56:08 **3** you think.
13:56:09 **4** Do you think a third-party scientist
13:56:11 **5** looking at Exhibit 12, without knowing context, just
13:56:15 **6** looking at what's in Exhibit 12, this EDSA spectrum,
13:56:18 **7** might say that also corresponds to minerals that
13:56:23 **8** aren't tremolite?
13:56:25 **9** MR. CIRSCH: Object to form. He's already
13:56:26 **10** answered the question. It calls for
13:56:28 **11** speculation.
13:56:28 **12** THE WITNESS: I can't speculate what other
13:56:30 **13** experienced microscopists would say that is.
13:56:34 **14** **Q.** (By Mr. Chachkes) Okay. And so you can't
13:56:36 **15** testify to a reasonable degree of scientific
13:56:39 **16** certainty that this EDSA pattern in a vacuum can only
13:56:46 **17** correspond to a single mineral and only that mineral
13:56:50 **18** tremolite?
13:56:50 **19** MR. CIRSCH: Object to form.
13:56:52 **20** THE WITNESS: Within a reasonable degree
13:56:56 **21** of scientific certainty, if I looked at this
13:56:57 **22** mineral, I would say that looks like tremolite.
13:56:59 **23** **Q.** (By Mr. Chachkes) So I'm not asking about
13:57:00 **24** you. I'm asking -- this is a question about
13:57:02 **25** reproducibility, that if some other scientist looked
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13:57:06 **1** at this, not you, okay, that are you testifying that
13:57:12 **2** within a reasonable degree of scientific certainty
13:57:15 **3** that this pattern can only correspond to tremolite?
13:57:20 **4** MR. CIRSCH: Object to form.
13:57:21 **5** THE WITNESS: I can't speculate what other
13:57:22 **6** scientists -- and they wouldn't be much of a
13:57:25 **7** scientist if they were going to look at this in
13:57:28 **8** a vacuum and then make some judgment on it
13:57:31 **9** without sitting at the TEM.
13:57:32 **10** If another very experienced scientist was
13:57:34 **11** sitting at a TEM looking at the counting rules
13:57:39 **12** and it's a regulated asbestos, he would most
13:57:42 **13** likely have some information about where it came
13:57:45 **14** from --
13:57:45 **15** **Q.** (By Mr. Chachkes) Okay. So the counting
13:57:46 **16** rules, how do they apply to Exhibit 12, the EDSA?
13:57:49 **17** **A.** Well, again, you cut me off. What I'm
13:57:53 **18** saying is I don't believe it would be a very -- that
13:57:56 **19** it's very scientific to sit in a vacuum and not know
13:58:00 **20** anything about anything and look at this, and how am
13:58:04 **21** I supposed to know what some other experienced
13:58:06 **22** scientist is going to say or do?
13:58:07 **23** **Q.** Okay. I'll represent to you I've shown
13:58:10 **24** this, what's in Exhibit 12, to a very experienced
13:58:15 **25** mineralogist who also does EDXA work, and that
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13:58:19 **1** person's confirmed that this is not a unique pattern
 13:58:22 **2** for tremolite, that there are other minerals that
 13:58:24 **3** correspond.
 13:58:25 **4** Sitting here today, do you have anything
 13:58:26 **5** to provide me that disputes that?
 13:58:28 **6** MR. CIRSCH: Object to form. I mean, how
 13:58:30 **7** can he possibly testify to that?
 13:58:36 **8** MR. CHACHKES: I mean, limit the speaking
 13:58:37 **9** objections, please.
 13:58:38 **10** THE WITNESS: It's EDXA. This came off a
 13:58:41 **11** tremolite fiber bundle that we verified, that in
 13:58:45 **12** the matrix that this came out of, it's well
 13:58:48 **13** established that those type of amphiboles are
 13:58:50 **14** formed.
 13:58:52 **15** What some other expert or experienced
 13:58:57 **16** microscopist is saying that it's going to be
 13:59:00 **17** confused with some other minerals, I can't
 13:59:02 **18** comment on it. If you'd like to tell me what
 13:59:05 **19** those minerals are, I could certainly look and
 13:59:08 **20** see if there's -- (cell phone rings.)
 13:59:10 **21** Is that me? I'm sorry. It's not supposed
 13:59:16 **22** to be on. I apologize.
 13:59:24 **23** **Q.** (By Mr. Chachkes) What work have you done
 13:59:28 **24** to survey the world of minerals to determine what
 13:59:36 **25** other minerals other than regulated asbestos could
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14:01:00 **1** at -- and I'm just talking about the EDSA now, I'm
 14:01:03 **2** not talking about counting or things that aren't the
 14:01:06 **3** EDSA -- I'm sorry. EDXA. Let me start that again.
 14:01:11 **4** I'm talking about just the EDXA now, not
 14:01:15 **5** talking about other methods of identifying what
 14:01:17 **6** you're looking at. Did you look at any textbook or
 14:01:21 **7** peer-reviewed literature to see what this pattern
 14:01:27 **8** could also -- in Exhibit 12 -- could also correspond
 14:01:30 **9** to?
 14:01:30 **10** MR. CIRSCH: Object to form.
 14:01:31 **11** THE WITNESS: It doesn't correspond -- and
 14:01:32 **12** you're --
 14:01:33 **13** **Q.** (By Mr. Chachkes) The question is what
 14:01:34 **14** you looked at.
 14:01:34 **15** **A. Please don't interrupt.**
 14:01:37 **16** MR. CIRSCH: Let him answer the question,
 14:01:38 **17** please.
 14:01:39 **18** THE WITNESS: You're trying to do this in
 14:01:40 **19** a vacuum. Here's just an EDS pattern, I'm not
 14:01:42 **20** going to give you any other information, I'm not
 14:01:43 **21** going to let you look at what kind of -- it's a
 14:01:45 **22** fibrous structure or it's a particulate. Not
 14:01:46 **23** going to let you look at the SAED patterns.
 14:01:50 **24** It's not following the procedure we've
 14:01:52 **25** used here for all these samples. So I can't
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13:59:40 **1** have EDSA patterns that correspond to what I'm
 13:59:46 **2** looking at in Exhibit 12?
 13:59:47 **3** MR. CIRSCH: Object to form.
 13:59:48 **4** THE WITNESS: I've looked at all the
 13:59:49 **5** potential look-alikes, and again, you just can't
 13:59:53 **6** do an EDS pattern without looking at the
 13:59:56 **7** structure. Some -- and I've looked at every one
 13:59:59 **8** that Sanchez says that could be look-alikes, and
 14:00:06 **9** a number of them are not fibrous and a lot of
 14:00:09 **10** them have aluminum in it. So I'm not concerned
 14:00:13 **11** that this is anything but tremolite asbestos.
 14:00:18 **12** **Q.** (By Mr. Chachkes) Did you look at any
 14:00:25 **13** databases to compare this spectra to what the
 14:00:28 **14** databases say are the things that have similar EDSA
 14:00:33 **15** patterns?
 14:00:33 **16** MR. CIRSCH: Object to form.
 14:00:34 **17** THE WITNESS: No, I didn't look at any
 14:00:37 **18** databases. This was done in regards to the
 14:00:39 **19** typical TEM protocols for identifying asbestos.
 14:00:42 **20** I'm not aware of any other minerals with all the
 14:00:46 **21** characteristics of both being fibrous, meaning
 14:00:48 **22** the counting definition, the amphibole
 14:00:54 **23** diffraction pattern for the d-spacings. This is
 14:00:57 **24** not misidentified.
 14:00:59 **25** **Q.** (By Mr. Chachkes) Okay. Did you look
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14:01:55 **1** comment on something that I wouldn't do as an
 14:01:58 **2** expert coming in here just looking at an EDS
 14:02:01 **3** pattern with -- EDXA pattern without any other
 14:02:04 **4** information.
 14:02:04 **5** **Q.** (By Mr. Chachkes) Okay. So am I correct
 14:02:06 **6** that your answer is no, you did not look at a
 14:02:09 **7** textbook or peer-reviewed literature to determine
 14:02:11 **8** what this EDSA pattern could also correspond to other
 14:02:15 **9** than what you believe to be tremolite?
 14:02:16 **10** MR. CIRSCH: Object to form.
 14:02:17 **11** THE WITNESS: No. I wouldn't just take an
 14:02:19 **12** EDS pattern by itself and then run it to see
 14:02:23 **13** what other possible minerals in the world have
 14:02:26 **14** the same elements.
 14:02:27 **15** I would only be testifying here that this
 14:02:29 **16** is tremolite -- regulated tremolite asbestos
 14:02:33 **17** based on the entirety of the analysis that's
 14:02:35 **18** done for each of these fibers or bundles.
 14:02:37 **19** **Q.** (By Mr. Chachkes) Okay. Let's talk about
 14:02:39 **20** SAED for a moment. You did SAED pattern analysis?
 14:02:43 **21** **A. Yes.**
 14:02:43 **22** **Q.** Okay. Would you agree that the more
 14:02:49 **23** complete the SAED pattern an analyst obtains, the
 14:02:52 **24** more likely the analyst is to make an accurate
 14:02:55 **25** determination of the crystal structure?
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14:02:56 **1** MR. CIRSCH: Object to form.
14:02:58 **2** THE WITNESS: No.
14:02:59 **3** **Q.** (By Mr. Chachkes) Why not?
14:02:59 **4** **A.** For tremolite you just need the
14:03:03 **5** d-spacings. For anthophyllite, you just need to --
14:03:07 **6** if it has anything close to the reflection or the
14:03:09 **7** crystal orientation of fibrous talc, you just need to
14:03:12 **8** turn it to make sure that the amphibole pattern comes
14:03:16 **9** up. You don't need to do anything more to adequately
14:03:20 **10** identify if it's anthophyllite versus fibrous talc or
14:03:25 **11** anthophyllite solid solution series.
14:03:28 **12** **Q.** Okay. Is streaking in your SAED pattern
14:03:32 **13** something that can get in the way of an accurate
14:03:35 **14** determination?
14:03:35 **15** **A.** It depends on what type of asbestos it is.
14:03:38 **16** If you're seeing streaking and you have the right
14:03:41 **17** chemistry and it's tubular, then it's chrysotile.
14:03:44 **18** But we don't see the streaking that's getting -- that
14:03:47 **19** you say is getting in the way to adequately look at
14:03:50 **20** these diffraction patterns.
14:03:51 **21** **Q.** If the dots on an SAED pattern are out of
14:03:56 **22** focus, does that affect the accuracy in your
14:03:59 **23** determining the crystal structure?
14:03:59 **24** **A.** Depends what you mean by out of focus. As
14:04:01 **25** long as you have the particular planes of dots, how
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14:04:04 **1** focused or out of focus it is sometimes doesn't
14:04:07 **2** matter. If it's way out of focus, yes, it would.
14:04:09 **3** **Q.** Would you agree that it's important to --
14:04:12 **4** strike that.
14:04:13 **5** Would you agree that the further out you
14:04:21 **6** have complete dots in the pattern and the more
14:04:23 **7** focused the image it is, the easier it is for the
14:04:26 **8** analyst to study the crystal structure?
14:04:28 **9** MR. CIRSCH: Object to form.
14:04:29 **10** THE WITNESS: It depends.
14:04:32 **11** **Q.** (By Mr. Chachkes) What does it depend on?
14:04:34 **12** **A.** Well, I have to get some examples and I
14:04:37 **13** can show you. You know, the patterns we have taken
14:04:41 **14** have been adequate for the analyst, plus the EDXA
14:04:45 **15** plus the fibrous nature to identify appropriately if
14:04:49 **16** it's -- typically what we're seeing is either the
14:04:52 **17** tremolite solid solution series, more tremolite than
14:04:56 **18** winchite or richterite or actinolite, and
14:04:59 **19** anthophyllite solid solution series. We don't take
14:05:02 **20** it any further than that.
14:05:02 **21** **Q.** So you testified that to determine whether
14:05:04 **22** something is tremolite, you just need to know the
14:05:07 **23** d-spacing; correct?
14:05:08 **24** MR. CIRSCH: Object to form.
14:05:09 **25** THE WITNESS: And the EDXA as well as
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14:05:11 **1** the -- if it is fibrous or not. That's all you
14:05:16 **2** need.
14:05:16 **3** **Q.** (By Mr. Chachkes) Okay.
14:05:17 **4** **A.** And that's all NVLAP requires.
14:05:21 **5** **Q.** Okay. And that's expressly written in the
14:05:25 **6** NVLA standard?
14:05:28 **7** **A.** I don't know if it's expressly written,
14:05:30 **8** but it's not required for any of the audits that we
14:05:33 **9** have, zone axis patterns for tremolite or any
14:05:37 **10** regulated asbestos.
14:05:37 **11** **Q.** Okay. So your opinion is that good
14:05:39 **12** science is determined by whether something passes
14:05:42 **13** NVLA accreditation?
14:05:43 **14** MR. CIRSCH: Object to form.
14:05:44 **15** THE WITNESS: It is good science. I don't
14:05:48 **16** know what good science mean. I mean, versus bad
14:05:50 **17** science?
14:05:51 **18** NVLAP is coming in to determine that if
14:05:55 **19** somebody sends you an air sample that you can
14:05:57 **20** adequately identify, or bulk sample, identify
14:06:01 **21** the asbestos to the degree that you're not
14:06:02 **22** letting people walk into an environment where
14:06:04 **23** they're getting exposed to asbestos.
14:06:07 **24** We go to the -- so that we perform the
14:06:11 **25** necessary analytical techniques for each of
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14:06:14 **1** these methods to positively affirm or deny that
14:06:19 **2** there's any detectable asbestos present.
14:06:21 **3** **Q.** (By Mr. Chachkes) Does the NVLA have in
14:06:23 **4** it an example of d-spacing that corresponds to
14:06:27 **5** tremolite?
14:06:29 **6** MR. CIRSCH: Object to the form.
14:06:30 **7** THE WITNESS: I believe so.
14:06:31 **8** **Q.** (By Mr. Chachkes) Okay. And we'd find
14:06:34 **9** that on their website?
14:06:35 **10** MR. CIRSCH: Object to form.
14:06:36 **11** THE WITNESS: I think so.
14:06:37 **12** **Q.** (By Mr. Chachkes) Okay. And then you
14:06:38 **13** said for anthophyllite, what do you need, again?
14:06:40 **14** **A.** For us, anthophyllite, we just make sure
14:06:44 **15** it's not fibrous talc, since we're looking at talc
14:06:50 **16** samples. And that the anthophyllite chemistry, the
14:06:55 **17** anthophyllite solid solution chemistry is
14:06:57 **18** appropriate, what we typically see is, because we're
14:07:00 **19** using heavy density liquid primarily, I think, all
14:07:03 **20** here, all with what I call iron-rich.
14:07:07 **21** **Q.** My question is what SAED pattern
14:07:10 **22** corresponds to anthophyllite?
14:07:12 **23** MR. CIRSCH: Object to form.
14:07:13 **24** THE WITNESS: Which one? There's 277 zone
14:07:16 **25** axes. We look for a typical d-spacing of a
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14:07:19 **1** different orientation for the two selected area
14:07:23 **2** electron diffraction patterns we take.
14:07:26 **3 Q.** (By Mr. Chachkes) Okay. So you determine
14:07:28 **4** whether it's anthophyllite based on d-spacing when
14:07:30 **5** you're talking about SAED only?
14:07:33 **6** MR. CIRSCH: Object to form.
14:07:33 **7** THE WITNESS: D-spacing and a second
14:07:36 **8** pattern from a different crystalline orientation
14:07:42 **9** so that you can rule out fibrous talc.
14:07:45 **10 Q.** (By Mr. Chachkes) Okay. So for
14:07:48 **11** tremolite, do you use two axes or just one?
14:07:52 **12 A.** Just one. It's not required for tremolite
14:07:56 **13** since fibrous talc does not have any calcium in it.
14:08:01 **14** And what you're looking for in an EDS pattern is make
14:08:05 **15** sure there's no aluminum.
14:08:07 **16 Q.** Okay. And for anthophyllite, you use --
14:08:10 **17** you need two axes is what you're saying?
14:08:13 **18 A.** Two axes unless -- I think there's one in
14:08:16 **19** the entire bunch where we only did one.
14:08:19 **20** One axis if it doesn't have that
14:08:22 **21** pseudohexagonal pattern of talc. There's one
14:08:26 **22** reflection in talc -- I can't remember if it's the
14:08:30 **23** 020 -- that some people say are similar. Doesn't
14:08:34 **24** look similar to me. But we just do two anyway for
14:08:38 **25** all these anthophyllite fibers and bundles.
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14:08:40 **1 Q.** Okay. For talc you use two axes to
14:08:43 **2** determine whether the SAED pattern corresponds to
14:08:46 **3** talc?
14:08:47 **4 A.** No, we use two for anthophyllite solid
14:08:51 **5** solution series.
14:08:52 **6 Q.** What about talc, how do you determine
14:08:54 **7** something under SAED is talc?
14:08:56 **8 A.** Chemistry and one SAED pattern that has
14:09:01 **9** the hexagonal dot pattern.
14:09:06 **10 Q.** Okay. So you use -- for the SAED portion
14:09:10 **11** of identifying something as talc, you use only one
14:09:13 **12** pattern; is that correct?
14:09:15 **13 A.** That's correct.
14:09:15 **14 Q.** Okay. If I took that one pattern that you
14:09:21 **15** use to identify talc under SAED, can that pattern
14:09:25 **16** only correspond to talc?
14:09:29 **17** MR. CIRSCH: Object to form.
14:09:30 **18** THE WITNESS: It can only correspond to
14:09:32 **19** talc as long as you have the chemistry to go
14:09:35 **20** along with it. Again, nothing here is done in a
14:09:37 **21** vacuum of just one and nothing else.
14:09:39 **22 Q.** (By Mr. Chachkes) Okay. My question
14:09:41 **23** really isn't a vacuum. And I understand your
14:09:43 **24** qualification you think it's completely unfair, but I
14:09:46 **25** do want to hear what you have to say about this.
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14:09:48 **1** If I have an isolated SAED pattern for
14:09:53 **2** talc in one axis and only that, no other information,
14:10:00 **3** does that uniquely identify talc?
14:10:02 **4** MR. CIRSCH: Object to form.
14:10:03 **5** THE WITNESS: I would not call it. I
14:10:04 **6** don't know what somebody else would do. I would
14:10:07 **7** want to see what we're looking at. Certainly if
14:10:09 **8** it's a talc plate versus chemistry -- but we're
14:10:13 **9** primarily interested in the fibrous talc.
14:10:15 **10** If you're an experienced TEM analyst, you
14:10:20 **11** wouldn't just do it -- to me, my opinion, you
14:10:23 **12** just wouldn't try in a vacuum without any
14:10:25 **13** information to look at a talc SAED and say
14:10:29 **14** that's talc.
14:10:30 **15 Q.** (By Mr. Chachkes) Okay. So recall that
14:10:31 **16** when I asked you my question, I'm saying looking at
14:10:34 **17** SAED in a vacuum and then you went on to talk about a
14:10:37 **18** number of things that aren't SAED, like chemistry,
14:10:41 **19** fibers, plates. So this is a very specific question
14:10:45 **20** and yes or no. Does a one-axis SAED pattern for talc
14:10:54 **21** uniquely identify this as talc?
14:10:58 **22** MR. CIRSCH: Object to form. He's already
14:10:59 **23** answered the question.
14:10:59 **24** THE WITNESS: I would not call it talc
14:11:01 **25** just based on a one hexagonal pattern with no
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14:11:06 **1** other information.
14:11:06 **2 Q.** (By Mr. Chachkes) Okay.
14:11:06 **3 A.** I would want to do -- and have the rest of
14:11:08 **4** the information that we talked about.
14:11:10 **5** I wouldn't do it. Maybe somebody else
14:11:12 **6** would. I can't comment on what other people might or
14:11:14 **7** might not do.
14:11:15 **8 Q.** Okay. So for tremolite, you are saying
14:11:18 **9** you look at one axis as well; correct?
14:11:20 **10 A.** Correct.
14:11:21 **11 Q.** So same question. In a vacuum, all you
14:11:25 **12** have is the SAED pattern for one axis for something
14:11:32 **13** you otherwise would call tremolite. Does that
14:11:34 **14** uniquely and only identify tremolite?
14:11:37 **15** MR. CIRSCH: Object to form.
14:11:38 **16** THE WITNESS: If you were going to do
14:11:42 **17** that, and you were -- for whatever reason that
14:11:46 **18** here is an SAED pattern, there is nothing else,
14:11:52 **19** if it was a zone axis, then you'd have to get
14:11:55 **20** two zone axes, and now you're dealing with like
14:11:58 **21** no chemistry, no idea where the tremolite fiber
14:12:01 **22** came -- if it is tremolite.
14:12:03 **23** So I would not do it. I can't talk about
14:12:05 **24** what other people would do.
14:12:06 **25 Q.** (By Mr. Chachkes) Okay. And indeed, a
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14:12:11 **1** single axis SAED pattern for something that in your
14:12:18 **2** report corresponds to tremolite can also correspond
14:12:23 **3** to many other crystalline structures as well;
14:12:26 **4** correct?
14:12:26 **5** MR. CIRSCH: Object to form.
14:12:27 **6** Q. (By Mr. Chachkes) Just in a vacuum.
14:12:29 **7** Again, with all the qualifications that you don't
14:12:32 **8** want to do it in a vacuum, but my question is in a
14:12:35 **9** vacuum.
14:12:35 **10** MR. CIRSCH: Object to form.
14:12:36 **11** THE WITNESS: It would be a typical
14:12:37 **12** amphibole diffraction pattern. You could say
14:12:39 **13** it's an amphibole, but how far you're willing to
14:12:41 **14** go on that on just that without any other
14:12:44 **15** information, no chemistry, no structure
14:12:48 **16** interface, no morphology, I would not call it
14:12:51 **17** tremolite.
14:12:51 **18** Q. (By Mr. Chachkes) Okay. So for
14:12:54 **19** anthophyllite, where you have two axes and so like
14:13:00 **20** two SAED patterns, in a vacuum, do those two patterns
14:13:06 **21** sitting in front of you, no other information,
14:13:08 **22** uniquely identify what you're looking at as
14:13:11 **23** anthophyllite?
14:13:11 **24** MR. CIRSCH: Object to form.
14:13:12 **25** THE WITNESS: I don't know. Certainly
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14:13:13 **1** would rule out talc with the two patterns.
14:13:16 **2** If I wasn't told that this came out of a
14:13:18 **3** cosmetic talc bulk sample and wasn't allowed to
14:13:21 **4** look at any chemistry, if I wasn't allowed to do
14:13:24 **5** any EDXA and morphology, I probably would not
14:13:31 **6** spend the time contemplating what that was.
14:13:33 **7** Q. (By Mr. Chachkes) Okay. You agree that
14:13:36 **8** the same particle can have different SAED patterns at
14:13:42 **9** different orientations; right?
14:13:43 **10** A. Yes.
14:13:43 **11** Q. And an SAED analyst can take measurements
14:13:49 **12** of the crystals on various axes; correct?
14:13:53 **13** A. Yes. You can get zone axis, and depending
14:13:56 **14** on the orientation of the fiber or bundle, you may
14:13:59 **15** get two -- tough to get three because of your limited
14:14:04 **16** mobility of tilting the fiber; you have to double
14:14:08 **17** tilt it. You could probably get three if one wanted.
14:14:11 **18** Q. Okay. Are you an expert in SAED pattern
14:14:17 **19** analysis?
14:14:18 **20** A. I probably know more than the average
14:14:20 **21** layperson.
14:14:21 **22** Q. Okay. But are you an expert? Are you
14:14:24 **23** somebody, for example, who maybe published any
14:14:27 **24** articles on SAED pattern analysis?
14:14:30 **25** MR. CIRSCH: Object to form.
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14:14:31 **1** THE WITNESS: I have not published any,
14:14:32 **2** no.
14:14:32 **3** Q. (By Mr. Chachkes) Have you taught SAED
14:14:34 **4** pattern analysis?
14:14:35 **5** A. Been a while, but yes.
14:14:37 **6** Q. To whom?
14:14:38 **7** A. Graduate students back in the day when I
14:14:41 **8** was visiting assistant professor.
14:14:42 **9** Q. How many orientations do you need to
14:14:47 **10** uniquely identify a mineral with SAED and only SAED?
14:14:52 **11** A. A minimum of two, maybe three.
14:14:54 **12** Q. Measurements on an SAED are taken in
14:15:01 **13** angstroms; correct?
14:15:02 **14** A. Yes, sir, an angle, angle between -- you
14:15:07 **15** identify, say, the 002, then you have to get to
14:15:10 **16** another orientation, say, the 010 or the minus 020,
14:15:17 **17** and then take the angles and do the measurements or
14:15:20 **18** use CrystalMaker.
14:15:21 **19** Q. Okay. CrystalMaker software that helps
14:15:24 **20** you analyze?
14:15:24 **21** A. Well, as long as it has the appropriate
14:15:26 **22** standards in it, you could.
14:15:28 **23** Q. Do you use CrystalMaker?
14:15:30 **24** A. We have CrystalMaker. But, no, it's not
14:15:32 **25** required for what we do.
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14:15:33 **1** Q. Okay. If you put what you otherwise
14:15:40 **2** identified as an SAED pattern for tremolite into
14:15:44 **3** CrystalMaker without the other end pop, the
14:15:47 **4** identification, this is tremolite?
14:15:49 **5** MR. CIRSCH: Object to form.
14:15:50 **6** THE WITNESS: If you had the appropriate
14:15:51 **7** zone axis and nothing else, it might.
14:15:54 **8** Q. (By Mr. Chachkes) You don't know one way
14:15:55 **9** or the other? Have you ever done that?
14:15:57 **10** A. Have we used CrystalMaker? We have used
14:15:59 **11** it in the past, but we don't use it for this
14:16:02 **12** analysis.
14:16:03 **13** Q. So have you done CrystalMaker on a single
14:16:06 **14** axis? Have you used CrystalMaker for a single axis
14:16:16 **15** SAED pattern?
14:16:16 **16** MR. CIRSCH: Object to form.
14:16:17 **17** THE WITNESS: I don't recall doing that.
14:16:18 **18** Q. (By Mr. Chachkes) Okay. When I talked
14:16:20 **19** about measurements being taken in angstroms, that's
14:16:22 **20** the measurement between the dots; right?
14:16:23 **21** A. Yes.
14:16:24 **22** Q. And that's what we're calling d-space?
14:16:27 **23** A. D-space is between the planes. That's the
14:16:28 **24** measurement we do now.
14:16:30 **25** Q. What's the difference between what I said
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14:16:32 **1** and what you said?
14:16:33 **2 A. Well, you can get to the different planes,**
14:16:35 **3 but you can also get to -- the d-spacing is the**
14:16:38 **4 layers of atoms on top of each other.**
14:16:40 **5 Q. Okay. Can you describe how your analyst**
14:16:50 **6 calibrates the SAED apparatus?**
14:16:55 **7 A. They do.**
14:16:55 **8 Q. No, I'm sorry, can you describe how they**
14:16:57 **9 do it?**
14:16:57 **10 A. Well, they get the working distance, and**
14:16:59 **11 typically they're using a gold standard for the rings**
14:17:02 **12 and the working distance so they can do that**
14:17:05 **13 calibration.**
14:17:05 **14 Q. When you say a gold standard, what do you**
14:17:07 **15 mean by that?**
14:17:07 **16 A. Well, you take something that's fibrous**
14:17:11 **17 and you put a gold film on the top so that you get**
14:17:14 **18 the outer rings of the gold, which is a standard**
14:17:16 **19 measurement, and then the working distance so you can**
14:17:18 **20 calibrate.**
14:17:19 **21 Q. Literally a standard made of gold; is that**
14:17:22 **22 what you're saying?**
14:17:23 **23 A. Yes. Well, it's a very small piece of**
14:17:26 **24 gold wire --**
25 Q. Okay.
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14:17:26 **1 A. -- that you sputter, so you're not using a**
14:17:28 **2 lot.**
14:17:29 **3 Q. How often do your analysts calibrate the**
14:17:33 **4 SAED apparatus?**
14:17:35 **5 A. Whatever is required for our NVLAP**
14:17:37 **6 accreditation.**
14:17:38 **7 Q. Do you have any -- sitting here today, do**
14:17:40 **8 you know what that is?**
14:17:40 **9 A. No.**
14:17:41 **10 Q. Is that in your report?**
14:17:43 **11 A. No, sir.**
14:17:44 **12 Q. Okay. So do your analysts tilt the stage**
14:17:56 **13 on the TEM to direct the electrons at a certain face**
14:18:00 **14 of the crystal?**
14:18:01 **15 MR. CIRSCH: Object to form.**
14:18:02 **16 THE WITNESS: The only fibrous material**
14:18:06 **17 that we tilt the stage is when we suspect the**
14:18:10 **18 anthophyllite solid solution series, where we**
14:18:13 **19 rotate it to make sure that the hexagonal**
14:18:19 **20 plane -- it's not even the hexagonal plane.**
14:18:23 **21 It's a -- I always forget. It's either an 020**
14:18:26 **22 or an 002 reflection off the talc, fibrous talc**
14:18:31 **23 orientation.**
14:18:37 **24 Q. (By Mr. Chachkes) Okay. Can you point me**
14:18:37 **25 to published peer-reviewed literature where that's an**
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14:18:37 **1 appropriate way to identify that mineral?**
14:18:39 **2 MR. CIRSCH: Object to form.**
14:18:40 **3 THE WITNESS: I can't. I mean, as I sit**
14:18:46 **4 here, I don't recall.**
14:18:47 **5 Q. (By Mr. Chachkes) Okay. Are the TEMs in**
14:18:51 **6 your lab equipped with -- I'm going to butcher the --**
14:18:56 **7 is it goniometer?**
14:18:57 **8 A. Goniometer.**
14:18:58 **9 Q. Okay. Are the TEMs in your lab equipped**
14:19:00 **10 with goniometers to rotate particles?**
14:19:03 **11 A. Yes. We have a double-tilt holder that we**
14:19:05 **12 use if we're going to do zone axis. And we have a**
14:19:08 **13 goniometer that can rotate the sample I think up to**
14:19:15 **14 30 degrees, so it's usually at zero tilt.**
14:19:21 **15 Q. Okay. In your report I don't see any SAED**
14:19:25 **16 patterns done for a single subject crystal in three**
14:19:29 **17 different axes. That's correct; right?**
14:19:31 **18 A. That is correct, you will not find that.**
14:19:32 **19 Q. And you didn't do that?**
14:19:33 **20 A. No.**
14:19:34 **21 Q. Okay. Did your analyst document every**
14:19:40 **22 instance in the report where they used multiple SAED**
14:19:44 **23 patterns?**
14:19:45 **24 A. I hope so.**
14:19:52 **25 MR. CHACHKES: Maybe we should -- let's go**
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14:19:54 **1 to this one.**
14:20:30 **2 (Defendants' Exhibit 15 was marked for**
14:20:32 **3 identification.)**
14:20:32 **4 Q. (By Mr. Chachkes) Okay. Marked as**
14:20:34 **5 Exhibit 15, you recognize this as a three-axis SAED**
14:20:38 **6 for tremolite; right?**
14:20:39 **7 A. I know that's what it states.**
14:20:40 **8 Q. In your opinion, is that different? Is**
14:20:43 **9 this not a three-axis?**
14:20:46 **10 A. Well, it says it's -- you know the 100,**
14:20:49 **11 the 010, and the 001, that would be three crystal**
14:20:53 **12 orientations by the Miller indices. Now, if that's**
14:20:56 **13 what we're looking at here or not, I would have to go**
14:20:59 **14 measure it, get the camera constant, et cetera.**
14:21:03 **15 So I'm not here to dispute it, but I can't**
14:21:06 **16 validate that's what it is.**
14:21:08 **17 Q. Is there anything -- looking at this right**
14:21:09 **18 now, is there any reason you have to dispute that**
14:21:11 **19 indeed this is an accurate three-axis SAED for**
14:21:16 **20 tremolite?**
14:21:17 **21 MR. CIRSCH: Object to form.**
14:21:18 **22 THE WITNESS: I have no reason to dispute**
14:21:19 **23 it. I have no reason to accept it.**
14:21:19 **24 Q. (By Mr. Chachkes) Okay.**
14:21:20 **25 A. If that's what you're saying it is, then**
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14:21:22 **1** that's what you're saying.
14:21:23 **2** Q. Okay. You see that the pattern is
14:21:26 **3** different for each of the three axes?
14:21:27 **4** A. Well, you have three different crystal
14:21:29 **5** orientations.
14:21:30 **6** Q. Okay.
14:21:31 **7** A. Of course it's going to be different.
14:21:32 **8** Q. Okay. So you predicted my next question,
14:21:36 **9** which is in your experience, three different crystal
14:21:38 **10** orientations for SAED for the same crystal may or
14:21:42 **11** probably will produce three different patterns;
12 correct?
14:21:44 **13** A. That is correct.
14:21:44 **14** Q. Okay. For tremolite it certainly will
14:21:48 **15** produce three different patterns?
14:21:50 **16** A. For most of your fibrous crystals where
14:21:54 **17** you can rotate it, yes.
14:21:56 **18** Q. Including anthophyllite and fibrous talc?
14:22:01 **19** MR. CIRSCH: Object to form.
14:22:02 **20** THE WITNESS: Including -- no. Fibrous
14:22:02 **21** talc, not. You can rotate it. You're only
14:22:05 **22** going to get one pattern. That's why if you do
14:22:09 **23** see the reflection that some people will argue
14:22:12 **24** looks a little bit like what anthophyllite can
14:22:15 **25** do, you rotate it, and that never changes.
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14:22:51 **1** MR. CHACKES: Okay. Let's mark as 16.
14:22:53 **2** (Defendants' Exhibit 16 was marked for
14:23:07 **3** identification.)
14:23:07 **4** Q. (By Mr. Chackes) Okay. So do you
14:23:09 **5** recognize what's been marked as Exhibit 16?
14:23:10 **6** A. Yes, Verification of 0-Degree Amphibole
14:23:13 **7** Diffraction Patterns, these are our documents.
14:23:16 **8** Q. Okay. This was produced to us, I think,
14:23:20 **9** Saturday. Do you recall giving this to plaintiffs'
14:23:23 **10** counsel recently --
14:23:24 **11** A. I do.
14:23:24 **12** Q. -- to produce?
14:23:27 **13** Okay. What is it? Can you just -- on a
14:23:28 **14** high level, what am I looking at?
14:23:31 **15** A. High level, we're looking at the
14:23:32 **16** d-spacings of, most likely, tremolite and
14:23:40 **17** anthophyllite.
14:23:40 **18** Q. And this corresponds to a number of
14:23:49 **19** samples that appear in your report; correct?
14:23:51 **20** A. It does.
14:23:51 **21** Q. Okay. And to figure out which page
14:23:56 **22** relates to which diffraction pattern, I can look on
14:24:01 **23** that page and it's written in there somewhere; right?
14:24:06 **24** A. You'll have to -- I'm sorry.
14:24:07 **25** Q. I think I might have messed that up
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14:24:12 **1** linguistically. I'm going to do that again.
14:24:13 **2** A. That's fine.
14:24:13 **3** Q. If I want to figure out which sample a
14:24:17 **4** particular verification page refers to, that sample
14:24:20 **5** is written on the page; correct?
14:24:21 **6** A. Yeah, each sample number is on here.
7 Q. Okay.
14:24:24 **8** A. You know, M68503-001. So you would look
14:24:28 **9** for '60, '70s, '80s, wherever it is, and then the
14:24:36 **10** second number, -001, would be the number 1 or the
14:24:38 **11** first asbestos structure or bundle that is the
14:24:42 **12** diffraction pattern is being taken.
14:24:44 **13** Q. Sorry. And you went a little quick for
14:24:47 **14** me, and I apologize --
14:24:49 **15** A. That's all right. So you see the number
14:24:50 **16** there, M68503 --
14:24:51 **17** Q. Okay. So I see that as MAS job number.
14:24:53 **18** That's where you're pointing?
14:24:54 **19** A. Right.
14:24:55 **20** Q. And can you actually, just so we're on the
14:24:55 **21** same page, literally, can you go to the first
14:25:00 **22** verification?
14:25:00 **23** Okay. So you've got the MAS job number,
14:25:02 **24** and I'm looking at the number that begins M68
14:25:05 **25** something, something, something. Okay. How does
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14:25:06 **1** that tell me what sample that refers to?
14:25:09 **2** A. Well, our job number would be M68503. If
14:25:14 **3** you go to the various '60s, '70s, and '80s, you'll
14:25:17 **4** see that number.
14:25:18 **5** Q. Sorry. Let's pause. '60s, '70s, and
14:25:21 **6** '80s, you're referring to year --
14:25:22 **7** A. The decades.
8 Q. Okay.
14:25:23 **9** A. And so then you look for -- if it has
14:25:26 **10** M68503 on there, you look for the first dash, 001.
14:25:31 **11** Q. And what's the first dash refer to?
14:25:33 **12** A. Right. That will tell you that that is
14:25:35 **13** the actual sample number. Then you can go -- it will
14:25:39 **14** tell you what tab to look under.
14:25:41 **15** And then the second sample number is 001,
14:25:44 **16** means that is the first asbestos, in this case,
14:25:49 **17** anthophyllite solid solution series. It's the very
14:25:53 **18** first structure up. So you can go then to the data
14:25:56 **19** there and find that very first diffraction pattern.
14:25:59 **20** Q. Okay. But when you say the data there, is
14:26:02 **21** that data you're referring to in Exhibit 16?
14:26:04 **22** A. No, the data that is in the actual data
14:26:07 **23** notebooks.
14:26:07 **24** Q. Got it. And your ability to identify
14:26:12 **25** '60s, '70s, '80s decades, is that something inherent
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14:26:17 **1** in the job number? Is that like coded in there? How
14:26:19 **2** did you --
14:26:19 **3** **A. That's why I used all of them.**
14:26:20 **4** **Q.** Oh, okay.
14:26:21 **5** **A.** If you'll give me one, I can -- you know,
14:26:22 **6** I can probably find it. I didn't bring those along.
14:26:24 **7** They're getting too big.
14:26:26 **8** **Q.** Okay. I see on this page, date verified
14:26:31 **9** 11/19/18; do you see that?
14:26:33 **10** **A.** Yes.
14:26:35 **11** **Q.** What does that mean? What was verified?
14:26:37 **12** **A.** That means that's the date that the data
14:26:39 **13** was run for this particular program that did this
14:26:44 **14** analysis.
14:26:45 **15** **Q.** Is that the date of the SAED as well?
14:26:48 **16** **A.** No. If you go over to the right-hand
14:26:51 **17** side, it says date of photo --
14:26:53 **18** **Q.** Okay.
14:26:54 **19** **A.** -- 10/29/2018, and the SAED pattern should
14:26:57 **20** have that date on it.
14:26:58 **21** **Q.** Got it. And when you say the data was run
14:27:02 **22** on November 19, 2018, was it put into some computer
14:27:07 **23** program, or someone did a hand d-spacing? How was
14:27:11 **24** that --
14:27:12 **25** **A.** No. The information is put in, it's all
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14:27:14 **1** digital, and it does the calculation. When you put
14:27:17 **2** in the, you know, the distance, the camera constant,
14:27:22 **3** and then it will calculate the d-spacing.
14:27:24 **4** **Q.** I'm sorry, when you say it, there's a
14:27:26 **5** software that you're using?
14:27:28 **6** **A.** Yes.
14:27:28 **7** **Q.** And does the software kind of just read
14:27:30 **8** the image? You don't have to actually calculate the
14:27:32 **9** d-spacing by hand?
14:27:33 **10** **A.** Well, you have to put in the information
14:27:35 **11** on the camera constant, but then it will read the
14:27:39 **12** pattern and calculate what the d-spacing is.
14:27:42 **13** **Q.** Got it. And do you know the name of that
14:27:44 **14** software?
14:27:45 **15** **A.** I do not.
14:27:46 **16** **Q.** Is that on your computer?
14:27:48 **17** **A.** It's on the TEM computers.
14:27:52 **18** **Q.** Okay. The numbers that it generates for
14:27:57 **19** d-spacing, is that fully disclosed here on this page?
14:28:03 **20** **A.** Yes.
14:28:04 **21** **Q.** Okay.
14:28:05 **22** **A.** Over here on the calculated spacing of
14:28:07 **23** 5.23, and if you go to anthophyllite, the d-spacing
14:28:11 **24** is in that range of 5.02 to 5.54 on the range, plus
14:28:17 **25** or minus 5 percent.

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14:28:19 **1** **Q.** And is the reason that zone axis
14:28:22 **2** information on the lower left is not put in there is
14:28:24 **3** because you really only ran one?
14:28:26 **4** **A.** Well, you can get a zone axis -- if you
14:28:28 **5** happen to hit a zone axis, it will -- you can
14:28:34 **6** calculate through that. The second anthophyllite
14:28:36 **7** pattern for this one fiber on the next page has a
14:28:41 **8** zone axis that said it was near the 101.
14:28:43 **9** **Q.** Got it. So you're saying is that the
14:28:48 **10** first verification page that I'm looking at is one
14:28:51 **11** zone axis, and the second page is another zone axis
14:28:54 **12** for the same anthophyllite particle?
14:28:55 **13** **A.** No. Not quite.
14:28:57 **14** **Q.** Okay.
14:28:57 **15** **A.** The first one is just d-spacing, the
14:28:59 **16** second one is just d-spacing. In this particular
14:29:02 **17** case when they went to the second orientation, they
14:29:05 **18** got very close to the 101 zone axis.
14:29:08 **19** **Q.** Okay. So there's two orientations on
14:29:11 **20** these page 1 and page 2, one is one orientation, the
14:29:14 **21** second is another orientation?
14:29:16 **22** **A.** Correct, for the same fiber/bundle.
14:29:18 **23** **Q.** Got it. We've looked through this, and
14:29:22 **24** we've totaled 35 samples, which is less than the 72
14:29:28 **25** samples in your report. Is that consistent with what
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14:29:31 **1** you believe this to be?
14:29:34 **2** MR. CIRSCH: Object to form.
14:29:35 **3** THE WITNESS: Well, a number of samples
14:29:38 **4** were negative. There would be no zone axis
14:29:42 **5** pattern.
14:29:42 **6** A number of the samples would not have
14:29:45 **7** been run through because we were doing
14:29:46 **8** verification of Lee Poye's samples, and there's
14:29:51 **9** a lot of different samples. I believe we have
14:29:53 **10** produced all the ones that we have taken.
14:29:55 **11** **Q.** (By Mr. Chachkes) Okay. There were 50
14:29:57 **12** positives amongst the 72 samples you looked at, and
14:30:00 **13** yet only 35 samples for which we have the diffraction
14:30:08 **14** verifications. Am I incorrect there?
14:30:11 **15** MR. CIRSCH: Object to form.
14:30:13 **16** THE WITNESS: Well, a number of positive
14:30:15 **17** samples there was no TEM because it was
14:30:19 **18** negative. The Lee Poye verification on his, he
14:30:25 **19** had six negatives where we found it positive by
14:30:29 **20** PLM. And then an extra sample. I'll have to
14:30:35 **21** add it all up now. I believe you have
14:30:38 **22** everything if we went through and did the math.
14:30:40 **23** **Q.** (By Mr. Chachkes) Okay. You had
14:30:41 **24** personally in your lab, MAS, 50 positives; right?
14:30:46 **25** MR. CIRSCH: Object to form.

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14:30:47 **1** Q. (By Mr. Chachkes) Let's strike that. All
14:30:57 **2** right.
14:30:57 **3** So the top of your own supplemental report
14:31:00 **4** reads that -- I'm going to read a sentence from your
14:31:05 **5** report, This new information changed the total number
14:31:07 **6** of containers/samples analyzed from 71 to 72 and the
14:31:11 **7** total positive samples from 49 to 50.
14:31:14 **8** That's accurate; right?
14:31:15 **9** A. Yes.
14:31:15 **10** Q. Okay. If there are 50 positives -- let's
14:31:19 **11** only talk about the positives. If there are 50
14:31:21 **12** positive, why only have verifications for 35?
14:31:24 **13** A. Well, off the top of my head, five of the
14:31:29 **14** positives out of six is from Lee Poye's analysis. We
14:31:34 **15** did not verify his negative samples. Those became
14:31:38 **16** positive because of the Blount PLM and the ISO PLM.
14:31:43 **17** Also, the two samples in Lee Poye where we could not
14:31:47 **18** verify the nine out of 11, they became positive by
14:31:52 **19** PLM. So now we're up to seven.
14:31:55 **20** Q. Of the 15 we're missing; right?
14:31:58 **21** A. Not missing any.
14:31:59 **22** Q. Okay.
14:31:59 **23** A. Now there's a number of samples through
14:32:02 **24** here where the PLM and/or ISO was positive and the
14:32:05 **25** TEM was not. If the TEM is negative, there's no
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14:32:09 **1** SAED. I think that will get you to your number.
14:32:13 **2** Q. Got it.
14:32:15 **3** So if there was a positive under TEM in
14:32:19 **4** the MAS laboratory, I've got the verification here in
14:32:23 **5** Exhibit 16?
14:32:26 **6** A. You are supposed to.
14:32:31 **7** MS. O'DELL: Let me just insert an
14:32:31 **8** objection. There were a number of I think six
14:32:33 **9** files that were produced very similar to
14:32:35 **10** Exhibit 16, so they're not all contained in that
14:32:37 **11** exhibit and --
14:32:37 **12** MR. CHACHKES: And I agree --
14:32:44 **13** MS. O'DELL: The record shouldn't reflect
14:32:45 **14** that they are. There are five more documents
14:32:48 **15** that are very similar to Exhibit 16 --
14:32:48 **16** MR. CHACHKES: Yeah.
14:32:51 **17** Q. (By Mr. Chachkes) And I apologize.
14:32:51 **18** Everything I said was correct, except you have to
14:32:54 **19** take the six files that you gave me, put them
14:32:57 **20** together, and we only have 35.
14:32:58 **21** A. I understood that.
14:32:59 **22** MR. CHACHKES: Okay. So as long as the
14:33:01 **23** witness understood, I think we're good.
14:33:03 **24** MS. O'DELL: That's not true, but I'm glad
14:33:06 **25** we clarified.
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14:33:08 **1** MR. CHACHKES: Well, I interpret "I
14:33:09 **2** understood" differently than you do.
14:33:11 **3** Q. (By Mr. Chachkes) Was a diffraction --
14:33:12 **4** okay. Skip that.
14:33:14 **5** Now, what are these ranges up here at the
14:33:20 **6** top? I see like a table. What's that? The same
14:33:25 **7** table appears to be reproduced in every single
14:33:27 **8** verification page; am I right?
14:33:28 **9** A. Right. That gives you the amphibole
14:33:30 **10** types, the page number it's on, card number for the
14:33:33 **11** mineral pallet diffraction file, and it gives the
14:33:37 **12** calculated spacings in the range.
14:33:39 **13** So these d-spacings are all tied back to a
14:33:44 **14** standard that every lab should have for these
14:33:50 **15** particular type of regulated asbestos structures.
14:33:53 **16** Q. Okay. The page number refers to a page of
14:33:57 **17** what, in the table?
14:33:59 **18** A. Page of the Mineral Powder Diffraction
14:34:02 **19** File Data for that particular mineral.
14:34:03 **20** So grunerite will be found on page 449.
14:34:07 **21** It will be card number 31-631. And on that card
14:34:11 **22** number it will give you the calculated d-spacings for
14:34:15 **23** that particular mineral.
14:34:16 **24** Q. Okay. So it's a page within the Mineral
14:34:21 **25** Powder Diffraction File, and then in that page is
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14:34:23 **1** something called a card. I imagine that's like a
14:34:25 **2** little box?
14:34:26 **3** A. Correct. And it will give you all the
14:34:30 **4** d-spacing information that's published here.
14:34:32 **5** Q. Okay. And the range, I see in the last
14:34:37 **6** column on the right, that's the margin of error?
14:34:41 **7** A. Correct.
14:34:42 **8** Q. Now, if I'm reading this correctly, U4, on
14:34:47 **9** this first page of the verification, you calculated a
14:34:50 **10** spacing of 5.23; correct?
14:34:53 **11** A. Correct.
14:34:54 **12** Q. And that falls within every single
14:34:57 **13** amphibole types range in that chart?
14:35:01 **14** A. That's correct.
14:35:01 **15** Q. How is it you identified this as
14:35:08 **16** anthophyllite when it falls within five different
14:35:13 **17** d-spacing ranges?
14:35:15 **18** A. Do I get to use the other data that's
14:35:17 **19** generated, or is this one of those in a vacuum type
14:35:19 **20** questions?
14:35:20 **21** Q. Let's say in a vacuum. In a vacuum.
14:35:22 **22** MR. CIRSCH: Object to form.
14:35:23 **23** THE WITNESS: I wouldn't -- if I just had
14:35:25 **24** the d-spacing without any information, I
14:35:28 **25** wouldn't make that call. I wouldn't say that it
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14:35:30 **1** was anthophyllite. I would say it is consistent
14:35:32 **2** with the typical amphibole d-spacing.
14:35:34 **3 Q.** (By Mr. Chachkes) Okay. What other
14:35:36 **4** amphibole in the Mineral Powder Diffraction File have
14:35:44 **5** d-spacing ranges that span 5.23?
14:35:48 **6 A.** Most of your amphibole minerals, both
14:35:52 **7 monoclinic and orthorhombic, will have d-spacings in**
14:35:56 **8 this range.**
14:35:57 **9 Q.** What about nonamphiboles, are there
14:36:01 **10** nonamphibole crystals that have d-spacings that the
14:36:03 **11** range covers 5.23?
14:36:05 **12 A.** I don't believe so.
14:36:06 **13 Q.** The --
14:36:31 **14 A.** Are we done with this one?
14:36:32 **15 Q.** For now, yes.
14:36:34 **16** Let's go to another exhibit. That's going
14:36:37 **17** to be -- let her mark it up.
18 A. Oh. Sorry.
14:36:41 **19** MR. CHACHKES: That's going to be 17.
14:36:43 **20** (Defendants' Exhibit 17 was marked for
14:36:59 **21** identification.)
14:36:59 **22 Q.** (By Mr. Chachkes) Is this the same sort
14:37:02 **23** of document as 16? Is this one of the --
14:37:04 **24 A.** Yes.
14:37:04 **25 Q.** Okay. At the top, I see that for your
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14:37:23 **1** SAED analysis you have an equation to determine
14:37:27 **2** spacing; do you see that?
14:37:28 **3 A.** We have the camera constant divided by the
14:37:34 **4** measured distance, yes.
14:37:35 **5 Q.** Okay. And in your -- your methodology
14:37:43 **6** determined the spacing by dividing the camera
14:37:45 **7** constant by the measured distance; is that correct?
14:37:48 **8 A.** Correct.
14:37:49 **9 Q.** And why does MAS use this formula?
14:37:52 **10 A.** That's the standard formula. You can --
14:37:57 **11** the pixels is part of the computer program where you
14:38:01 **12** could -- in the old days you'd actually measure it.
14:38:03 **13 Q.** Can you provide a reference in the
14:38:05 **14** scientific literature that reflects this equation?
14:38:08 **15 A.** CrystalMaker has it.
14:38:12 **16 Q.** CrystalMaker software; right?
14:38:15 **17 A.** Software. Yes, somewhere I can find it
14:38:17 **18** from the old days the formula for this.
14:38:20 **19 Q.** Okay. You didn't cite anything in your
14:38:22 **20** paper, correct, in your reports; correct?
14:38:25 **21 A.** No, because it's a standard method that
14:38:27 **22** all TEM labs do that do this, so.
14:38:30 **23 Q.** The manual -- I'm sorry, the measured
14:38:34 **24** distance than the denominator, that's manually
14:38:38 **25** measured, or is that measured automatically by
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14:38:39 **1** software?
14:38:39 **2 A.** It's measured off the image that's been
14:38:43 **3** calibrated.
14:38:43 **4 Q.** Okay. It's measured off the image --
14:38:45 **5 A.** Of the diffraction -- diffraction pattern
14:38:48 **6** when you run the program, yes.
14:38:48 **7 Q.** Okay. So it's measured by the program,
14:38:50 **8** not somebody -- a human being with a ruler?
14:38:51 **9 A.** Not anymore.
14:38:53 **10 Q.** Okay. Used to be manual?
14:38:54 **11 A.** Old days, yes.
12 Q. Okay.
14:38:56 **13 A.** When you actually took a negative and
14:38:58 **14** every TEM lab had a dark room. And thank goodness
14:39:03 **15** those days are over.
14:39:04 **16 Q.** Can you provide me a reference in the
14:39:07 **17** scientific literature that permits the identification
14:39:16 **18** of an asbestos type strictly by an EDS -- sorry --
14:39:25 **19** SAED pattern? Strike that. Let me ask that better.
14:39:28 **20** Can you provide me a reference in the
14:39:29 **21** published literature -- in the scientific literature
14:39:31 **22** that sanctions identifying an asbestos simply by a
14:39:39 **23** single axis SAED pattern?
14:39:42 **24 A.** I think we already talked about that. I'm
14:39:44 **25** not sure any scientific literature would say if
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14:39:47 **1** you're only handed the information from one zone axis
14:39:51 **2** diffraction pattern without the rest of the
14:39:55 **3** information -- if you have a good zone axis and it
14:40:01 **4** matches, you may be able to do the calculation.
14:40:06 **5** So one zone axis -- you might be able to
14:40:11 **6** do that if you're looking at between two different
14:40:14 **7** minerals, say, a monoclinic versus an orthorhombic.
14:40:19 **8** If you have no information whatsoever, I
14:40:25 **9** don't know. I don't know if you could do it with
14:40:27 **10** just one. I'd have to see.
14:40:28 **11 Q.** Okay. The Mineral Powder Diffraction File
14:40:32 **12** Data, is that a book I can go out in the library and
14:40:36 **13** get?
14:40:37 **14** MR. CIRSCH: Object to form.
14:40:38 **15** THE WITNESS: I imagine, if it's only an
14:40:39 **16** engineering library or a library at a
14:40:42 **17** university. You can order it online.
14:40:44 **18 Q.** (By Mr. Chachkes) Okay. It's generated
14:40:46 **19** by somebody outside of MAS?
14:40:48 **20 A.** No, this is not an MAS book. This is the
14:40:54 **21** Mineral Powder Diffraction File Data Book. There's
14:40:55 **22** an international standard for these types of cards
14:40:59 **23** for the crystalline structure information.
14:41:01 **24 Q.** Okay. What's the d-spacing for talc?
14:41:15 **25 A.** I don't know.
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14:41:17 **1** Q. Is the d-spacing for talc within the
14:41:22 **2** ranges we see here for -- in your chart for regulated
14:41:26 **3** asbestos?
14:41:26 **4** A. It's been a while since I've calculated
14:41:30 **5** it, so I'd have to look that up.
14:41:33 **6** Q. Why do you only have amphiboles in your
14:41:41 **7** reference chart?
14:41:46 **8** MR. CIRSCH: Object to form.
14:41:47 **9** THE WITNESS: Because this is the 0-degree
14:41:50 **10** amphibole diffraction pattern table.
14:41:53 **11** Q. (By Mr. Chachkes) So are you assuming
14:41:56 **12** going into looking at the SAED pattern that you're
14:41:59 **13** looking at an amphibole, or you're saying the
14:42:02 **14** amphibole patterns that you're looking at could
14:42:04 **15** only -- the patterns you're looking at could only be
14:42:06 **16** amphiboles?
14:42:07 **17** A. There's no serpentine materials in here.
14:42:12 **18** We've never measured chrysotile -- ever detected
14:42:15 **19** chrysotile asbestos in any of the TEM analysis
14:42:17 **20** because of the heavy liquid density separation.
14:42:21 **21** And we don't go in blind or in a vacuum
14:42:24 **22** when we do this. The chrysotile diffraction patterns
14:42:29 **23** are very unique; the morphology is very unique. So
14:42:33 **24** when we have amphiboles, we have a different chart.
14:42:36 **25** Q. And again -- strike that.
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14:42:44 **1** I think I already asked this question, I
14:42:48 **2** apologize if I'm asking it twice, but there are
14:42:51 **3** nonamphiboles that have d-spacing within the ranges
14:42:53 **4** we see in this chart, that is, crystals that are
14:43:00 **5** nonamphiboles?
14:43:00 **6** A. Most amphiboles will have d-spacings in
14:43:03 **7** this range.
14:43:04 **8** Q. My question is are there crystals that
14:43:08 **9** aren't amphiboles and aren't serpentine that have
14:43:11 **10** d-spacings in this range?
14:43:13 **11** MR. CIRSCH: Object to form.
14:43:14 **12** THE WITNESS: Nonamphiboles, not that I'm
14:43:16 **13** aware of.
14:43:16 **14** Q. (By Mr. Chachkes) For example, are there
14:43:17 **15** any phyllosilicates that have d-spacing in these
14:43:21 **16** ranges?
14:43:21 **17** A. I don't believe so.
14:43:22 **18** Q. Okay. You're stating to within a degree
14:43:25 **19** of scientific certainty there aren't any --
14:43:28 **20** MR. CIRSCH: Object --
14:43:28 **21** THE WITNESS: When I say I don't believe
14:43:29 **22** so, I don't think I hold that within a
14:43:32 **23** reasonable degree of scientific certainty.
14:43:33 **24** Again, I'm not looking at this in a
14:43:36 **25** vacuum. If you have the amphibole d-spacing,
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14:43:39 **1** you have the appropriate chemistry. In these
14:43:41 **2** cases they did zone axis for these particular
14:43:44 **3** samples, for these two samples, so zone axis for
14:43:52 **4** 1 and 2.
14:43:55 **5** So, you know, I don't know how many
14:43:58 **6** nonamphiboles are out there, but there's nothing
14:44:02 **7** that I'm aware of if you're looking at all the
14:44:04 **8** appropriate information and not looking at this
14:44:07 **9** in a vacuum. None of this has ever -- you've
14:44:10 **10** got to understand, none of this is ever done in
14:44:12 **11** a vacuum. It's coupled with the chemistry,
14:44:14 **12** coupled with the morphology, and also we have a
14:44:16 **13** pretty good idea of what kind of matrix it's in.
14:44:20 **14** Q. (By Mr. Chachkes) Okay.
14:44:21 **15** A. It's cosmetic talc.
14:44:22 **16** Q. So, I'm sorry, the methods you use to
14:44:26 **17** identify asbestos are -- there's TEM, there's XRD,
14:44:34 **18** and there's PLM. Are those the three, the big three?
14:44:38 **19** A. Those are the -- really the only ones
14:44:41 **20** is -- yeah, XRD is used, but the big two are TEM and
14:44:47 **21** PLM.
14:44:47 **22** Q. Okay. So is there anything in the
14:44:52 **23** published scientific literature, peer-reviewed, that
14:44:55 **24** says you can take an analysis under each of TEM, XRD,
14:45:00 **25** and PLM, none of which conclusively point to a
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14:45:04 **1** regulated asbestos, but together you can determine
14:45:07 **2** that it's a regulated asbestos?
14:45:09 **3** MR. CIRSCH: Object to form.
14:45:10 **4** THE WITNESS: Well, you're wrong about
14:45:18 **5** this. XRD cannot point to anything. Can't tell
14:45:21 **6** you if it's fibrous or not.
14:45:24 **7** Polarized light microscopy by itself can
14:45:26 **8** tell you if you have regulated asbestos.
14:45:29 **9** Transmission electron microscopy itself can tell
14:45:31 **10** you if it's regulated asbestos.
14:45:34 **11** Both techniques have their strengths and
14:45:38 **12** their weaknesses. This type of analysis, in my
14:45:41 **13** opinion, needs the suite of techniques: the PLM,
14:45:48 **14** the Blount PLM, and TEM.
14:45:51 **15** For Vermont and Italian talc, I don't
14:45:54 **16** think XRD serves any useful purpose.
14:45:56 **17** Q. (By Mr. Chachkes) Okay. Let's just ask
14:45:58 **18** the question again.
14:46:00 **19** Now, the assumption of the hypothetical is
14:46:02 **20** that your TEM result independently does not
14:46:07 **21** conclusively point to a regulated asbestos, that your
14:46:11 **22** XRD independently, that is, independent of the other
14:46:14 **23** analyses, does not conclusively point to a regulated
14:46:17 **24** asbestos, and that your PLM, similarly, independently
14:46:20 **25** does not point to a regulated asbestos.
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14:46:22 **1** Can those three together conclusively
14:46:28 **2** point to a regulated asbestos --
14:46:31 **3** MR. CIRSCH: Object to form.
14:46:32 **4** **Q.** (By Mr. Chachkes) -- each one making up
14:46:33 **5** for the other's defects, in a way?
14:46:36 **6** MR. CIRSCH: Object to form.
14:46:36 **7** THE WITNESS: Well, there's no defects
14:46:38 **8** like you state. I can't answer a question where
14:46:40 **9** you're saying if all three are negative or
14:46:42 **10** nondetects, because it's either nondetect or you
14:46:45 **11** have identified the regulated asbestos.
14:46:47 **12** So if you're telling me I have three
14:46:49 **13** nondetects, then, no, I can't point to any
14:46:52 **14** regulated asbestos in three nondetects.
14:46:54 **15** **Q.** (By Mr. Chachkes) Okay.
14:46:55 **16** **A.** Before you start, we've been going over an
14:46:57 **17** hour. Can we go off the record?
14:46:59 **18** **Q.** Can I maybe ask a couple more questions on
14:47:01 **19** the same line, and I'll finish it up, if that's okay?
14:47:03 **20** **A.** If you insist.
14:47:04 **21** **Q.** I don't do this that often but --
14:47:06 **22** **A.** That's fine.
14:47:07 **23** **Q.** It's fascinating science.
14:47:09 **24** Okay. So we agreed that the single zone
14:47:16 **25** axis SAED pattern in a vacuum didn't point to
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14:47:18 **1** asbestos, right, even though you're saying it's
14:47:20 **2** asbestos; right?
14:47:22 **3** MR. CIRSCH: Object to form.
14:47:23 **4** THE WITNESS: I don't think we agreed to
14:47:24 **5** that. It depends on the zone that you get. If
14:47:28 **6** you were to sit down and just look at that by
14:47:32 **7** itself, a 302, you could probably eliminate a
14:47:36 **8** lot.
14:47:37 **9** But based with all the other information,
14:47:39 **10** if the zone axis -- if you're getting a zone
14:47:42 **11** axis, that means you have something that you got
14:47:44 **12** a zone axis off of.
14:47:45 **13** **Q.** (By Mr. Chachkes) Right.
14:47:47 **14** **A.** But you're asking this hypothetical in a
14:47:47 **15** vacuum. That's not what we do. I can't -- I've not
14:47:52 **16** sat down and tried since graduate school where they
14:47:54 **17** give you a mineral and just give you XRD pattern and
14:47:57 **18** say go identify it. It's not something that we would
14:48:01 **19** ever do for any of these analyses without the
14:48:03 **20** morphology and without the chemistry.
14:48:07 **21** **Q.** Okay. Last question. I'll ask it one
14:48:11 **22** more time because I don't think I've gotten the
14:48:13 **23** answer. If you want to give the same answer, it's
14:48:16 **24** fine, but I'm giving you the opportunity to answer
14:48:18 **25** this.
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14:48:19 **1** If I had a single crystal, I had a TEM
14:48:21 **2** analysis that in a vacuum could point to many things,
14:48:25 **3** not just asbestos, an XRD that could point to many
14:48:29 **4** things, not just asbestos, and in a vacuum PLM that
14:48:32 **5** could point to many things, not just asbestos, is
14:48:35 **6** there any published peer-reviewed literature that I
14:48:38 **7** can look at that says that's a situation where you
14:48:41 **8** can combine the three and say that indeed is
14:48:43 **9** asbestos?
14:48:44 **10** MR. CIRSCH: Object to form.
14:48:45 **11** THE WITNESS: I can't answer a
14:48:46 **12** hypothetical that would never happen in a
14:48:49 **13** working real lab that does this analysis. You
14:48:51 **14** wouldn't sit there and go, I've run these three
14:48:53 **15** and I have no clue what it is, now I'm going to
14:48:57 **16** combine it all together and say, gee, that's
14:48:58 **17** going to tell me.
14:48:59 **18** I can't answer that hypothetical.
14:49:03 **19** Somebody else will have to wade through that
14:49:05 **20** one.
14:49:06 **21** MR. CHACHKES: Okay. Let's take a break.
14:49:08 **22** THE WITNESS: Thank you.
14:49:08 **23** (Recess from 2:49 p.m. to 3:07 p.m.)
15:07:57 **24** **Q.** (By Mr. Chachkes) So Dr. Longo, in your
15:09:18 **25** diffraction verification documents, sometimes the
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15:09:25 **1** bottom -- that's not a good example.
15:09:30 **2** Let's look at Exhibit 16, and let's look
15:09:38 **3** at the first verification page. Sometimes in the
15:09:41 **4** lower left, as we discussed, the zone axis
15:09:44 **5** information is just not -- there's nothing filled in
15:09:47 **6** there; right?
15:09:47 **7** **A.** Correct.
15:09:47 **8** **Q.** If it's blank, does that mean that this
15:09:54 **9** particular image was not taken at a zone axis?
15:09:57 **10** **A.** That is correct.
15:09:58 **11** **Q.** Does MAS maintain nonasbestiform reference
15:10:06 **12** samples for tremolite?
15:10:08 **13** **A.** Well, yes and no. Most -- tremolite
15:10:15 **14** standard has both. If you go to the one I brought --
15:10:26 **15** and when we say nonasbestiform, we're saying it's not
15:10:31 **16** meeting the 5-to-1 aspect ratio. That's less. It
15:10:36 **17** certainly still could be asbestiform since it's
15:10:39 **18** fibrous, but those we do not count in our analysis
15:10:46 **19** using the TEM protocols, which are the standard
15:10:50 **20** methods for scientists to identify asbestos. And you
15:10:54 **21** can understand, these protocols are all heavily
15:10:55 **22** vetted and peer-reviewed.
15:11:03 **23** For example, my ASTM D5755 method took six
15:11:07 **24** years to get it through the 125 scientists. And all
15:11:07 **25** these methods have been published in the
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15:11:10 **1** peer-reviewed literature since any time anybody
15:11:14 **2** publishes anything on the measurement of asbestos,
15:11:16 **3** they will reference one of these protocols.
15:11:19 **4** Q. Do you remember what my original question
15:11:22 **5** was? So the question was do you have -- so let's
15:11:24 **6** make it easier.
15:11:25 **7** Do you have a bottle of nonasbestiform
15:11:27 **8** tremolite at MAS?
15:11:29 **9** MR. CIRSCH: Object to form.
15:11:30 **10** THE WITNESS: I'm not sure a bottle of
15:11:32 **11** nonasbestiform tremolite actually exists. You
15:11:34 **12** typically find both. Somebody may call it
15:11:37 **13** nonasbestiform; but when you go look through it,
15:11:40 **14** or they say it's asbestos, you'll find
15:11:42 **15** structures that are less than the 5-to-1 aspect
15:11:47 **16** ratio. We don't count those.
15:11:49 **17** Q. (By Mr. Chachkes) Do you have a bottle at
15:11:52 **18** MAS of nonasbestos -- of tremolite where, on average,
15:11:56 **19** its aspect ratio is below 5-to-1?
15:11:59 **20** MR. CIRSCH: Object to form.
15:12:00 **21** THE WITNESS: I'm not sure any such thing
15:12:02 **22** exists. We don't have what doesn't exist.
15:12:05 **23** Q. (By Mr. Chachkes) Okay. Do you have a
15:12:06 **24** bottle in your office of anthophyllite where the
15:12:11 **25** aspect ratio of the anthophyllite is all underneath
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15:12:14 **1** 5-to-1?
15:12:15 **2** MR. CIRSCH: Object to form.
15:12:16 **3** THE WITNESS: No. You have them that have
15:12:19 **4** a range of aspect ratios, less than 5-to-1,
15:12:23 **5** greater than 5-to-1. The average is typically
15:12:25 **6** above 5-to-1.
15:12:26 **7** Q. (By Mr. Chachkes) Okay. So you don't
15:12:27 **8** have a bottle in your office of an amphibole that has
15:12:37 **9** aspect ratios averaging under 5-to-1?
15:12:41 **10** MR. CIRSCH: Object to form.
15:12:42 **11** THE WITNESS: No. All the bottles with
15:12:44 **12** standards we have are actual asbestos, but they
15:12:46 **13** do have a portion that are below 5-to-1.
15:12:48 **14** Q. (By Mr. Chachkes) And that's because it's
15:12:50 **15** a big bell curve and some of that bell curve is over
15:12:53 **16** on the less than 5-to-1 and some of it is on the
15:12:55 **17** right?
15:12:55 **18** A. That's correct. The NIST standard for
15:12:58 **19** tremolite, I think the average -- even with the less
15:13:00 **20** than 5-to-1, greater than 5-to-1, is around 10.
15:13:04 **21** Q. Is your opinion that there's literature
15:13:13 **22** supporting your position that you always find both
15:13:16 **23** asbestiform and nonasbestiform amphiboles together?
15:13:19 **24** A. I believe so.
15:13:20 **25** Q. Can you tell me --
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15:13:22 **1** A. I can't tell you right now. I mean,
15:13:24 **2** sometimes I anticipate cross-exam -- you know,
15:13:28 **3** discovery depositions, but I'm not aware of any that
15:13:32 **4** somebody states this is all, quote, nonasbestiform or
15:13:35 **5** all cleavage fragments.
15:13:38 **6** Q. Okay.
15:13:38 **7** A. What I see -- and I'll have to dig it
15:13:40 **8** up -- is that if you have one, you have the other.
15:13:42 **9** Q. And you don't cite any such literature in
15:13:45 **10** your expert report, do you?
15:13:47 **11** A. No, sir, I'm not making the claim that --
15:13:52 **12** what I'm doing in my expert report is saying here's
15:13:55 **13** what we measured using the standard TEM, well-vetted
15:14:00 **14** protocols for the identification of regulated
15:14:02 **15** asbestos.
15:14:02 **16** Q. Do you remember the question was about
15:14:03 **17** whether --
15:14:04 **18** MR. CIRSCH: I don't know if he finished
15:14:05 **19** the answer yet.
15:14:06 **20** Q. (By Mr. Chachkes) Yeah. Do you remember
15:14:08 **21** the question?
15:14:08 **22** MR. CIRSCH: I --
15:14:12 **23** THE WITNESS: I remember --
15:14:12 **24** THE REPORTER: One at a time.
15:14:12 **25** THE WITNESS: I remember the question, but
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15:14:14 **1** the answer is it's not something that I was
15:14:16 **2** relying on for my identification of regulated
15:14:18 **3** asbestos. I'm relying on the peer-reviewed
15:14:22 **4** publications for the standard TEM methods and
15:14:26 **5** standard PLM methods.
15:14:27 **6** Q. (By Mr. Chachkes) Do you have a standard
15:14:28 **7** in your lab of an SAED readout for an amphibole with
15:14:35 **8** ratios of less than 5-to-1 aspect ratios?
15:14:39 **9** MR. CIRSCH: Object to form.
15:14:46 **10** Q. (By Mr. Chachkes) So I'm not asking
15:14:47 **11** whether you have incidentally such a thing but a
15:14:49 **12** standard that you use to compare against?
15:14:52 **13** A. Well, no, there's nothing to compare. The
15:14:56 **14** less than 5-to-1 aspect ratio versus greater than
15:14:59 **15** 5-to-1 aspect ratio will have the identical
15:15:02 **16** d-spacings and identical diffraction patterns.
15:15:05 **17** There's no difference in a, quote, less than 5-to-1
15:15:08 **18** and greater than 5-to-1. You just will have the
15:15:12 **19** exact same type of patterns for d-spacing, and if you
15:15:14 **20** were to do a zone axis, you'll have the same zone
15:15:18 **21** axis.
15:15:18 **22** Q. Okay. So it's your opinion that for SAED,
15:15:20 **23** a single nonasbestiform tremolite crystal and a
15:15:24 **24** single asbestiform tremolite crystal will have the
15:15:28 **25** same SAED patterns?
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15:15:31 **1** MR. CIRSCH: Object to form.
15:15:32 **2** THE WITNESS: Yes.
15:15:32 **3** **Q.** (By Mr. Chachkes) Okay. Is the same true
15:15:33 **4** for EDXA?
15:15:34 **5** **A.** **It is.**
15:15:34 **6** **Q.** Is the same true that the PLM will look
15:15:38 **7** the same for an asbestiform fragment and a
15:15:41 **8** nonasbestiform fragment of tremolite?
15:15:44 **9** **A.** **Well, let's be clear. I'm not calling it**
15:15:47 **10** **asbestiform and nonasbestiform. I'm calling it --**
15:15:49 **11** **for the 22262-1, it's materials that are less than**
15:15:54 **12** **3-to-1 aspect ratio. They'll have the same**
15:16:00 **13** **refractive indices, same information.**
15:16:03 **14** **There's no difference in the crystalline**
15:16:04 **15** **structure between what's less than 5-to-1 or less**
15:16:08 **16** **than whatever the aspect ratio is for a particular**
15:16:11 **17** **method that you're using. There's no difference.**
15:16:14 **18** **That's how you either count greater than**
15:16:17 **19** **or equal to 5-to-1 aspect ratio for TEM. Or in the**
15:16:22 **20** **PLM we're looking at bundles that typically are -- I**
15:16:26 **21** **think all of them were -- the individual fibers and**
15:16:28 **22** **the bundles were greater than 20-to-1.**
15:16:31 **23** **Where we draw the line is in the method**
15:16:34 **24** **when it says anything less than 3-to-1 is not**
15:16:36 **25** **counted. And that's what we do. We call them**
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15:16:38 **1** **cleavage fragments.**
15:16:39 **2** **Q.** Have you ever heard anyone distinguishing
15:16:41 **3** asbestiform and nonasbestiform tremolite by virtue of
15:16:44 **4** whether it has parallel fibers?
15:16:48 **5** MR. CIRSCH: Object to form.
15:16:49 **6** THE WITNESS: Yes. If it is a bundle, by
15:16:52 **7** definition, it is asbestiform. Both Ann Wylie
15:16:56 **8** and both the 22262-1 and the R-93 as well as --
15:17:02 **9** and TEM's different. You take the overall
15:17:05 **10** aspect ratio of a bundle width to length.
15:17:09 **11** That's how we distinguish between a regulated
15:17:13 **12** asbestos fiber and not. But even in TEM, if it
15:17:15 **13** is a bundle, hence it is asbestiform.
15:17:17 **14** **Q.** (By Mr. Chachkes) Okay. Would the SAED
15:17:19 **15** pattern for tremolite with parallel fibers and
15:17:22 **16** tremolite that does not exhibit parallel fibers be
15:17:26 **17** the same?
15:17:27 **18** **A.** **Yes.**
15:17:28 **19** **Q.** Okay. Same --
15:17:29 **20** **A.** **For the right orientation, same**
15:17:31 **21** **orientation, yeah. Yes.**
15:17:32 **22** **Q.** What about on all three orientations?
15:17:35 **23** **A.** **I haven't done it on all three**
15:17:37 **24** **orientations because we don't count those if it has**
15:17:40 **25** **less than the counting aspects, and we typically only**
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15:17:43 **1** **do d-spacings following the peer-reviewed published**
15:17:46 **2** **protocols.**
15:17:47 **3** **Q.** Okay. Do you have any opinion on whether
15:17:50 **4** a tremolite with parallel fibers and a tremolite that
15:17:53 **5** does not have parallel fibers would indeed have
15:17:56 **6** identical d-spacings on all three axes for SAED?
15:18:03 **7** **A.** **We haven't done three-axis SAEDs for**
15:18:08 **8** **something that is not counted as a regulated asbestos**
15:18:11 **9** **fiber. Single individual fibers will have the same**
15:18:16 **10** **d-spacing range, will have the same selected area**
15:18:20 **11** **electron diffraction zone axis if you go to the**
15:18:23 **12** **particular orientation.**
15:18:25 **13** **Q.** So I'm going to ask again because my
15:18:29 **14** question's only about -- it's not about what you've
15:18:30 **15** done, it's about what something looks like.
15:18:37 **16** Does the SAED for tremolite that has
15:18:39 **17** parallel fibers look exactly the same on three axes
15:18:44 **18** as a tremolite that does not have parallel fibers?
15:18:48 **19** MR. CIRSCH: Object to form.
15:18:49 **20** **Q.** (By Mr. Chachkes) Putting aside whether
15:18:51 **21** you've done it or not, as a matter of science, are
15:18:54 **22** they the same? You can say you don't know, but I
15:18:56 **23** need that question answered.
15:18:57 **24** MR. CIRSCH: Object to form.
15:18:58 **25** THE WITNESS: It should be the same. But
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15:18:59 **1** it's not something that we do, because it's not
15:19:01 **2** part of the peer-reviewed published standard
15:19:04 **3** protocols. When it is -- when it is not
15:19:10 **4** parallel sides or it doesn't meet the 5-to-1
15:19:12 **5** aspect ratio, it is not recorded.
15:19:15 **6** **Q.** (By Mr. Chachkes) Do you know of any
15:19:17 **7** published literature that confirms that they should
15:19:20 **8** be the same?
15:19:21 **9** **A.** **It's not -- I believe so, yes.**
15:19:35 **10** **Q.** What?
15:19:35 **11** **A.** **Again, it has to do with surface charts.**
15:19:41 **12** **I don't recall the citation.**
15:19:42 **13** **Q.** Okay. Sitting here today you can't give
15:19:44 **14** me a citation for that?
15:19:45 **15** **A.** **No, sir, I did not anticipate that we were**
15:19:48 **16** **going to be debating non -- debating asbestos**
15:19:54 **17** **minerals that we don't count or don't put into our**
15:19:58 **18** **report.**
15:19:58 **19** **Q.** Okay. What about under PLM, does a
15:20:03 **20** tremolite that has parallel fibers look the same
15:20:07 **21** under PLM as a tremolite that does not have parallel
15:20:11 **22** fibers?
15:20:11 **23** **A.** **No.**
15:20:12 **24** **Q.** What about TEM when you're looking at just
15:20:15 **25** morphology, do the two look the same?
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15:20:18 **1** **A.** If it's not parallel, it's not going to
15:20:20 **2** look the same. If it's PLM and you can't see the
15:20:22 **3** individual fibers in the bundles, it's not going to
15:20:25 **4** look the same.
15:20:25 **5** **Q.** Okay. Do you have a standard reference
15:20:28 **6** standard for PLM for tremolite that does not have
15:20:35 **7** parallel fibers?
15:20:36 **8** **A.** And again, I guess we're going back to a
15:20:39 **9** bottle of cleavage fragments. No. But we do
15:20:42 **10** routinely see tremolite/actinolite cleavage fragments
15:20:48 **11** that are less than 3-to-1 aspect ratio that is
15:20:51 **12** recorded in -- and they have the same properties that
15:20:55 **13** give us the refractive indices and identification.
15:20:57 **14** Otherwise, you wouldn't be able to identify it.
15:20:59 **15** **Q.** Do you have a standard TEM photograph
15:21:03 **16** showing morphology that is for tremolite that does
15:21:08 **17** not exhibit parallel fibers?
15:21:12 **18** **A.** I don't know if we have recorded typical
15:21:17 **19** nonparallel sides on a TEM structure that has the
15:21:22 **20** same chemistry, but we do not record any of our
15:21:26 **21** analyses as per the peer-reviewed published
15:21:30 **22** protocols.
15:21:31 **23** **Q.** Okay. Would your answers be the same for
15:21:36 **24** anthophyllite?
15:21:36 **25** **A.** It would be the same.
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15:21:38 **1** **Q.** Okay. For all those questions whether you
15:21:40 **2** keep the separate standard?
15:21:42 **3** **MS. O'DELL:** Object to the form.
15:21:44 **4** **THE WITNESS:** If -- we don't keep a
15:21:45 **5** separate standard because we do not record
15:21:49 **6** amphibole structures that have the same
15:21:51 **7** chemistry, same diffraction pattern types, that
15:21:55 **8** are not part of the counting protocols for these
15:21:58 **9** peer-reviewed protocols for the analysis.
15:22:01 **10** **Q.** (By Mr. Chachkes) Taking you back to your
15:22:05 **11** November reports, your November 14 reports, it's my
15:22:09 **12** understanding that in it you confirmed that -- that
15:22:28 **13** in it you confirm that the SAED confirmed regulated
15:22:33 **14** asbestos; is that correct?
15:22:35 **15** **MR. CIRSCH:** Object to form.
15:22:36 **16** **THE WITNESS:** We confirmed that the -- I
15:22:42 **17** don't believe we said it like that. What we
15:22:44 **18** confirmed is following the peer-reviewed
15:22:48 **19** published protocols, either for TEM or polarized
15:22:53 **20** light microscopy using the methodology that
15:22:56 **21** takes you through the steps to determine if it's
15:22:59 **22** regulated asbestos, primarily the counting rule,
15:23:02 **23** the chemistry, and the crystalline structure.
15:23:05 **24** That's why they have all three. None of this is
15:23:08 **25** done in a vacuum. That's what we did.
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15:23:11 **1** **Q.** (By Mr. Chachkes) Let me just ask you the
15:23:15 **2** straight question. Did your November report confirm
15:23:17 **3** that SAED patterns confirmed regulated asbestos in
15:23:21 **4** J&J bottles of talc?
15:23:25 **5** **MR. CIRSCH:** Object to form.
15:23:25 **6** **THE WITNESS:** I'd have to see the context
15:23:27 **7** because it has to be all the information that's
15:23:30 **8** done. Regulated asbestos goes with the counting
15:23:34 **9** rules, that's the first -- counting rules on the
15:23:36 **10** structure, parallel sides, the diffraction
15:23:40 **11** pattern, and the chemistry. That's how the
15:23:43 **12** protocol says to do this. Not just an SAED by
15:23:48 **13** itself, not an EDS by itself, and not the
15:23:52 **14** morphology by itself. You have to use all three
15:23:55 **15** for TEM analysis. That's how the protocol goes.
15:24:03 **16** **MR. CHACHKES:** Okay. Let me ask you in
15:24:04 **17** this way. Let's mark this next exhibit.
15:24:23 **18** (Defendants' Exhibit 18 was marked for
15:24:23 **19** identification.)
15:24:23 **20** **Q.** (By Mr. Chachkes) So can you confirm that
15:24:25 **21** Exhibit 18 is one of your SAEDs?
15:24:29 **22** **MR. CIRSCH:** On the back of here I see
15:24:30 **23** some -- okay.
15:24:30 **24** **MS. TROVATO:** On the back -- sorry.
15:24:30 **25** **MR. CHACHKES:** Here. Take mine.
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15:24:32 **1** **MR. CIRSCH:** I wanted to make sure that
15:24:32 **2** you --
15:24:38 **3** **Q.** (By Mr. Chachkes) So can you confirm
15:24:41 **4** Exhibit 18 is of your SAED patterns?
15:24:46 **5** **MS. O'DELL:** Would you direct us? Is
15:24:47 **6** there a specific page in his November report
15:24:48 **7** that you're referring to?
15:24:50 **8** **THE WITNESS:** I see it right here. It's
15:24:51 **9** the M68233-001-001, which matches the M number
15:25:00 **10** and fiber number. It says that we -- date of
15:25:04 **11** photo was 2/14/2018. So that is one of our
15:25:09 **12** diffraction patterns.
15:25:10 **13** **Q.** (By Mr. Chachkes) Okay. Does this
15:25:14 **14** confirm that there is anthophyllite in J&J talc,
15:25:21 **15** Exhibit 18 alone?
15:25:23 **16** **A.** You keep saying alone, and you keep saying
15:25:26 **17** in a vacuum. That's not how it's done. The
15:25:30 **18** methodology doesn't say take the SAED alone. We have
15:25:34 **19** the chemistry that goes with it and the morphology.
15:25:36 **20** There's a reason it takes you through those steps.
15:25:39 **21** **Q.** Okay. So the question is does Exhibit 18
15:25:45 **22** alone confirm anthophyllite?
15:25:49 **23** **MR. CIRSCH:** Object.
15:25:49 **24** **Q.** (By Mr. Chachkes) It's just yes or no.
15:25:50 **25** **MR. CIRSCH:** It's not yes or no.
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15:25:51 **1** THE WITNESS: It's not yes or no. It's --
15:25:54 **2** again, my answer is you do not look at these
15:25:57 **3** patterns alone. You're using a peer-reviewed
15:26:01 **4** published protocol that walks you through
15:26:04 **5** morphology, EDXA, and a diffraction pattern.
15:26:09 **6** That's how the protocol goes.
15:26:11 **7** It's not my protocol. These are the
15:26:13 **8** protocols for the ISO methods, for the AHERA
15:26:16 **9** methods, the ASTM -- TEM methods. There is a
15:26:19 **10** reason you do all of them.
15:26:21 **11** **Q.** (By Mr. Chachkes) Right. So it's my
15:26:23 **12** understanding that this is an answerable question.
15:26:25 **13** If you say it's completely unanswerable, tell me.
15:26:30 **14** And I understand you don't like it when I've asked
15:26:32 **15** you about something in a vacuum, but the question
15:26:34 **16** stands. In a vacuum, Exhibit 18, is that a uniquely
15:26:37 **17** anthophyllite pattern?
15:26:37 **18** MR. CIRSCH: Object to form. That's been
15:26:39 **19** asked and answered.
15:26:40 **20** THE WITNESS: And my answer stands.
15:26:41 **21** **Q.** (By Mr. Chachkes) Okay. And that
15:26:43 **22** answer's what? If you're not going to answer, just
15:26:48 **23** tell me.
15:26:48 **24** MS. O'DELL: He's already answered.
15:26:48 **25** MR. CIRSCH: He's already answered the
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15:26:51 **1** question.
15:26:51 **2** THE WITNESS: My answer stands. The
15:26:53 **3** previous answer.
15:26:53 **4** **Q.** (By Mr. Chachkes) Okay. Now, I'm looking
15:26:54 **5** at Exhibit 17, which I believe corresponds to this;
15:26:58 **6** right?
15:26:58 **7** **A.** **Yes.**
15:26:59 **8** **Q.** Okay. Page 1 of the -- the first
15:27:03 **9** verification, it shows date verified as 2/14. Do you
15:27:07 **10** see that?
15:27:07 **11** **A.** **Correct.**
15:27:08 **12** **Q.** That means on the same day of the photo
15:27:12 **13** you actually put this picture into the software to
15:27:14 **14** determine the d-spacing; correct?
15:27:16 **15** **A.** **That's correct.**
15:27:17 **16** **Q.** Okay. For many of the SAED patterns that
15:27:21 **17** have been produced in this case, the verification
15:27:24 **18** came after your November report; correct?
15:27:27 **19** **A.** **That's correct.**
15:27:27 **20** **Q.** Some of them came after -- came as late as
15:27:33 **21** January; right?
15:27:33 **22** **A.** **That may be possible.**
15:27:34 **23** **Q.** Okay. So you were using, for the purposes
15:27:36 **24** of at least the November report, some of the EDSA
15:27:41 **25** patterns you had not run d-spacing on?
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15:27:44 **1** MR. CIRSCH: Object to form.
15:27:45 **2** THE WITNESS: That's correct. Well, we
15:27:46 **3** had taken the data, and the photograph was
15:27:50 **4** taken. You know, when the verification came
15:27:52 **5** through, it may have been done later.
15:27:54 **6** **Q.** (By Mr. Chachkes) Yeah, and I might have
15:27:56 **7** misspoke.
15:27:56 **8** So what I'm saying is that for some of the
15:27:58 **9** samples in the November report, you had not run the
15:28:01 **10** d-spacing for the SAED; is that correct?
15:28:04 **11** **A.** **That's possible.**
15:28:05 **12** **Q.** Okay. Is the d-spacing important to
15:28:08 **13** determining whether SAED is pointing towards a
15:28:11 **14** regulated asbestos?
15:28:13 **15** MR. CIRSCH: Object to form.
15:28:14 **16** THE WITNESS: It's all important. If you
15:28:16 **17** do this long enough, you can look at it and say
15:28:18 **18** that's an amphibole diffraction pattern. But
15:28:20 **19** the verification just solidifies it.
15:28:23 **20** **Q.** (By Mr. Chachkes) Okay. Why did you run
15:28:30 **21** verifications after your first report and as late as
15:28:36 **22** January for SAED verifications?
15:28:41 **23** MR. CIRSCH: Object to form.
15:28:42 **24** THE WITNESS: Because they've all been
15:28:44 **25** taken, just getting to them. Certainly if it
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15:28:46 **1** didn't verify it, then we'd have something else
15:28:49 **2** to talk about today.
15:28:50 **3** **Q.** (By Mr. Chachkes) How many particles did
15:29:02 **4** your analyst conduct zone axis determinations on?
15:29:05 **5** MR. CIRSCH: Object to form.
15:29:06 **6** THE WITNESS: How many fibrous structures?
15:29:08 **7** **Q.** (By Mr. Chachkes) Yes.
15:29:09 **8** **A.** **I haven't counted them up.**
15:29:10 **9** **Q.** Could it be about a dozen?
15:29:12 **10** MR. CIRSCH: Object to form.
15:29:13 **11** THE WITNESS: Again, I haven't counted
15:29:14 **12** them up.
15:29:15 **13** **Q.** (By Mr. Chachkes) Okay. And earlier we
15:29:18 **14** talked about how it's difficult to distinguish talc
15:29:24 **15** and anthophyllite with EDXA; right?
15:29:30 **16** MR. CIRSCH: Object to form.
15:29:31 **17** THE WITNESS: I didn't say it was
15:29:32 **18** difficult. What I said was you would not
15:29:35 **19** identify it by just EDXA. You would use the
15:29:38 **20** procedures in place, all the procedures, to make
15:29:41 **21** that determination if you have fibrous talc
15:29:44 **22** versus anthophyllite.
15:29:44 **23** **Q.** (By Mr. Chachkes) And when you say all
15:29:45 **24** the procedures, you mean procedures above and beyond
15:29:47 **25** EDXA?
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15:29:48 **1 A. Procedures that are stated in the**
15:29:52 **2 peer-reviewed protocols that we use.**
15:29:54 **3 Q. That are above and beyond EDXA?**
15:29:57 **4 MR. CIRSCH: Object to form.**
15:29:59 **5 THE WITNESS: Well, they're all above and**
15:30:02 **6 beyond EDXA. None of this is done in a vacuum.**
15:30:05 **7 No analyst is just looking at the EDXA and not**
15:30:06 **8 following the protocols as published in the**
15:30:07 **9 peer-reviewed literature for making these**
15:30:09 **10 determinations.**
15:30:10 **11 Q. (By Mr. Chachkes) You were saying that a**
15:30:11 **12 way to tell the difference between talc and**
15:30:15 **13 anthophyllite in SAED is to tilt the goniometer --**
15:30:27 **14 A. Goniometer.**
15:30:28 **15 Q. -- goniometer; is that right?**
15:30:30 **16 A. That's correct.**
15:30:31 **17 Q. Okay. In every instance -- are there**
15:30:41 **18 instances where you looked at a particle for a J&J**
15:30:47 **19 sample in the MDL and tilted the gon --**
15:30:56 **20 A. Goniometer.**
15:30:56 **21 Q. -- goniometer and determined, oh, well,**
15:30:58 **22 that's talc?**
15:30:59 **23 A. That's certainly possible.**
15:31:06 **24 Q. Okay. Is it that you don't know because**
15:31:09 **25 your analyst would have done it and not reported that**
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15:31:11 **1 to you?**
15:31:12 **2 MR. CIRSCH: Object to form.**
15:31:12 **3 THE WITNESS: Well, we were only taking a**
15:31:14 **4 random talc verification of some of these for**
15:31:17 **5 one fiber, it's at the end of the -- each of the**
15:31:21 **6 analyses where there was fibrous talc present in**
15:31:24 **7 the TEM, there is an SAED, EDS, and a picture**
15:31:30 **8 showing the morphology.**
15:31:31 **9 These particular ones are not talc. These**
15:31:36 **10 are zone axis. This happens to be the**
15:31:41 **11 historical 1978 that was produced through**
15:31:47 **12 Lanier, and these zone axis orientations are not**
15:31:52 **13 what the so-called look-alike zone axis for the**
15:31:57 **14 talc fiber.**
15:31:59 **15 Q. (By Mr. Chachkes) I'm sorry, you're**
15:32:00 **16 saying that what's in Exhibit 17 are non-MDL samples?**
15:32:06 **17 A. No, it is an MDL sample. I said it is an**
15:32:08 **18 MDL sample.**
15:32:09 **19 Q. Oh, okay. When you said produced through**
15:32:11 **20 Lanier, I didn't understand what you meant there.**
15:32:14 **21 A. Well, it went to Lanier and went to us.**
15:32:18 **22 Q. Okay.**
15:32:18 **23 A. The 1978 --**
15:32:21 **24 Q. Got it.**
15:32:25 **25 A. -- two samples for one container. I think**
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15:32:25 **1 it's JBP-084.**
15:32:31 **2 Q. Earlier we talked about how cummingtonite**
15:32:39 **3 and anthophyllite have the same chemistry; do you**
15:32:42 **4 remember that?**
15:32:42 **5 A. Yes.**
15:32:42 **6 Q. One way to tell them apart is to determine**
15:32:45 **7 the crystal system of the particle?**
15:32:47 **8 A. Correct. You could go in and do zone axis**
15:32:50 **9 and get a monoclinic versus the orthorhombic.**
15:32:53 **10 Q. Okay. So anthophyllite is orthorhombic,**
15:32:56 **11 and cummingtonite is monoclinic?**
15:32:59 **12 A. That is correct.**
15:32:59 **13 Q. Okay. Did you do the analysis to**
15:33:03 **14 determine whether what you were looking at and**
15:33:07 **15 thought might be anthophyllite to see whether it was**
15:33:10 **16 monoclinic and thus cummingtonite?**
15:33:12 **17 A. No, we don't do that. We just call it the**
15:33:15 **18 anthophyllite solid solution series since both**
15:33:18 **19 anthophyllite, cummingtonite, and grunerite are**
15:33:22 **20 regulated asbestos.**
15:33:22 **21 Q. Okay.**
15:33:23 **22 A. There's no -- unless you want to do that**
15:33:26 **23 for some reason, there's no need to go any further.**
15:33:28 **24 Q. Okay. So everything in your expert report**
15:33:31 **25 that you identify as anthophyllite could very well be**
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15:33:36 **1 cummingtonite, but your position it doesn't matter?**
15:33:39 **2 MR. CIRSCH: Object to form.**
15:33:40 **3 THE WITNESS: Well, everything could be**
15:33:42 **4 anthophyllite and it still doesn't matter. You**
15:33:45 **5 know, if you use the analogy, well, I found the**
15:33:48 **6 weed and it's a particular weed that is a**
15:33:50 **7 problem and we need to get rid of it, now I want**
15:33:53 **8 to go look and see what color roots it has**
15:33:55 **9 because the weed itself all looks the same.**
15:33:58 **10 This particular one, these zone axes are**
15:34:00 **11 anthophyllite for, I believe, in these two --**
15:34:05 **12 this was the one that Dr. Sanchez says was**
15:34:08 **13 cummingtonite, and so we went back and did zone**
15:34:11 **14 axis just some time ago. And actually, these**
15:34:14 **15 two structures are in fact anthophyllite.**
15:34:17 **16 Q. (By Mr. Chachkes) You mean you do zone**
15:34:19 **17 axis to determine whether it was orthorhombic or**
15:34:22 **18 monoclinic?**
15:34:23 **19 A. Well, we did zone axis to make sure that**
15:34:25 **20 it was orthorhombic and had the reflections, that it**
15:34:28 **21 had the crystalline orientation specific for**
15:34:30 **22 orthorhombic anthophyllite.**
15:34:32 **23 Q. Did you produce the material that shows**
15:34:33 **24 that sample to be orthorhombic?**
15:34:36 **25 A. Number 17.**
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15:34:37 **1** Q. That's number 17? Okay.

15:34:40 **2** A. **The first one, especially. I know for the**

15:34:42 **3 301.**

15:34:44 **4** Q. And for the other -- it's fair to say that

15:34:50 **5** most of the particles in this case that you've

15:34:52 **6** identified as anthophyllite could very well be

15:34:55 **7** cummingtonite, but you didn't make the distinction?

15:34:59 **8** MR. CIRSCH: Object to form.

15:34:59 **9** Q. (By Mr. Chachkes) Putting aside whether

15:35:01 **10** it matters or not.

15:35:02 **11** MR. CIRSCH: Object to form.

15:35:03 **12** THE WITNESS: Well, most of these

15:35:06 **13** elongated particles, these asbestiform bundles,

15:35:10 **14** could be anthophyllite --

15:35:11 **15** Q. (By Mr. Chachkes) The ones --

15:35:12 **16** MR. CIRSCH: Hold on.

15:35:13 **17** THE WITNESS: -- versus cummingtonite.

15:35:15 **18** But it's a difference without any consequence.

15:35:18 **19** They're both regulated asbestos.

15:35:19 **20** Q. (By Mr. Chachkes) Right. Putting aside

15:35:21 **21** the difference, okay -- this is just a question that

15:35:25 **22** should be very simple -- most of the part -- except

15:35:28 **23** for the one you went back and verified whether it was

15:35:31 **24** orthorhombic, most of the particles you identify in

15:35:34 **25** your report could either be -- that you identify as
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15:35:37 **1** anthophyllite could either be anthophyllite or

15:35:39 **2** cummingtonite, putting aside whether it even matters;

15:35:42 **3** is that a correct statement?

15:35:43 **4** MR. CIRSCH: Object to form.

15:35:44 **5** THE WITNESS: No. You don't know if most

15:35:46 **6** of the particles could. It could be this, it

15:35:48 **7** could be that. It could be mostly all

15:35:50 **8** anthophyllite.

15:35:52 **9** You know, you think it's all

15:35:54 **10** cummingtonite. But you're right, it doesn't

15:35:55 **11** matter because I identified them as the

15:36:01 **12** anthophyllite solid solution series.

15:36:02 **13** Q. (By Mr. Chachkes) Okay. Is there

15:36:03 **14** literature calling cummingtonite part of the

15:36:05 **15** anthophyllite solid solution series?

15:36:05 **16** A. **Lots of it.**

15:36:05 **17** Q. Okay. Can you cite one for me? Let's

15:36:10 **18** start with this. Any cited in your report?

15:36:11 **19** A. **Yes.**

15:36:12 **20** Q. Okay. Can you --

15:36:14 **21** A. **Can I show it to you?**

15:36:16 **22** Q. Yes, show it to me.

15:36:18 **23** A. **And I produced it in other J&J.**

15:36:37 **24** **It's easier for me just to look through**

15:36:41 **25** **the references and find it for you.**
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15:36:43 **1** Q. That's okay. That's fine. We'll just

15:36:44 **2** leave it as is.

15:36:45 **3** A. **I believe it's -- let me just make sure**

15:36:46 **4** **it's in here.**

15:36:55 **5** **It's reference 23, Manual of Mineralogy,**

15:36:58 **6** **21st Edition, Revised, Cornelis Klein and**

15:37:04 **7** **Cornelius S. Hurlbut, Jr., from John Wiley & Sons,**

15:37:07 **8** **and it's on page about 256, if I remember correctly.**

15:37:11 **9** Q. Okay. What other mono -- okay.

15:37:15 **10** If your EDS doesn't tell you whether -- if

15:37:19 **11** you haven't determined whether what you're looking at

15:37:21 **12** is orthorhombic or monoclinic, are there any other

15:37:24 **13** minerals that they could be that are indeed also

15:37:28 **14** monoclinic?

15:37:29 **15** A. **No. Not after we do the full suite of**

15:37:31 **16** **analyses. It's one of these regulated asbestos types**

15:37:34 **17** **for the anthophyllite solid solution series.**

15:37:37 **18** Q. Okay.

15:37:37 **19** A. **These have been identified to the degree**

15:37:42 **20** **necessary to make that statement.**

15:37:43 **21** Q. Okay. Just -- and we're going to ask a

15:37:45 **22** question in a vacuum, and I understand all your

15:37:48 **23** objections to answering questions about science in a

15:37:50 **24** vacuum, but it's important to us.

15:37:53 **25** If you have an SAED pattern where you
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15:37:56 **1** didn't determine whether it's orthorhombic or not,

15:38:00 **2** just looking at that pattern, in a vacuum, without

15:38:03 **3** your other information, is it possible -- can you

15:38:08 **4** exclude -- is it possible that correlates to any

15:38:12 **5** other monoclinic minerals?

15:38:14 **6** MR. CIRSCH: Object to form.

15:38:15 **7** THE WITNESS: I've already answered this

15:38:16 **8** question.

15:38:16 **9** We don't look at it in a vacuum. You're

15:38:18 **10** asking me to look at things in a vacuum that are

15:38:21 **11** not part of the peer-reviewed published

15:38:25 **12** identification protocols for asbestos.

15:38:27 **13** That's what we do. We look at and follow

15:38:29 **14** the procedures that are in the protocols. So

15:38:33 **15** when we do this analysis, especially for

15:38:36 **16** anthophyllite, we're looking at morphology,

15:38:38 **17** we're looking at chemistry, and we're looking at

15:38:40 **18** selected area electron diffraction.

15:38:43 **19** Q. (By Mr. Chachkes) So --

15:38:43 **20** MR. CIRSCH: Hold on.

15:38:44 **21** THE WITNESS: And that's my answer.

15:38:45 **22** Q. (By Mr. Chachkes) So you understand I'm

15:38:46 **23** allowed to ask questions that aren't specifically

15:38:49 **24** correlating to something in a regulation; right? I

15:38:51 **25** can ask about general science. You understand that;
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15:38:53 **1** right?

15:38:54 **2** MR. CIRSCH: Object to form. He can give

15:38:56 **3** you an answer --

4 **Q.** (By Mr. Chachkes) Yes or no?

15:38:57 **5** MR. CIRSCH: -- he thinks is appropriate.

15:38:59 **6** **Q.** (By Mr. Chachkes) It's a yes or no

15:39:01 **7** question.

15:39:01 **8** **A.** Well, yes, you can ask any question you

15:39:04 **9** want. But, no, I don't think it's appropriate to ask

15:39:07 **10** questions that is not part of how we identify and ask

15:39:12 **11** in a vacuum. So my answer stands.

15:39:13 **12** **Q.** Okay. So I'll ask you again, and if you

15:39:14 **13** don't want to answer, you can give me the same

15:39:16 **14** circular answer, but I'm going to ask you again.

15:39:19 **15** MR. CIRSCH: Object to the commentary on

15:39:21 **16** the record, Alex. There's a lot of it.

15:39:23 **17** **Q.** (By Mr. Chachkes) If the -- looking at --

15:39:26 **18** if you haven't determined whether something is

15:39:29 **19** orthorhombic or not, looking at the SAED pattern in a

15:39:36 **20** vacuum, could it correspond to other minerals besides

15:39:40 **21** cummingtonite and anthophyllite?

15:39:43 **22** MR. CIRSCH: Object to form.

15:39:45 **23** THE WITNESS: That's not how we have done

15:39:46 **24** this analysis for every one of these samples

15:39:49 **25** that we're dealing with in TEM, for the 100,
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15:39:52 **1** almost 200 fibers and bundles that we've

15:39:55 **2** identified. We have used the peer-reviewed

15:39:59 **3** standard published protocol specifically to

15:40:02 **4** identify regulated asbestos. We didn't look at

15:40:05 **5** anything in a vacuum. We don't do that.

15:40:07 **6** **Q.** (By Mr. Chachkes) Okay. Putting that

15:40:09 **7** aside, this is just a matter of EDSA science. EDSA

15:40:14 **8** science tells me that Exhibit 18 looked at in

15:40:19 **9** isolation could correspond to many minerals; right?

15:40:25 **10** MS. O'DELL: Objection.

15:40:25 **11** **Q.** (By Mr. Chachkes) Just EDSA science?

15:40:28 **12** **A.** Again, we're not dealing with many

15:40:30 **13** minerals. We're dealing with regulated asbestos in a

15:40:33 **14** talc deposit that has the ability to form these

15:40:37 **15** billions of years ago under temperature and pressure.

15:40:40 **16** We're using protocols that are specifically designed

15:40:42 **17** to identify regulated asbestos. And that's what we

15:40:45 **18** do.

19 **Q.** Okay.

15:40:47 **20** **A.** Asking things in a vacuum or hypotheticals

15:40:49 **21** is not what we did.

15:40:51 **22** MR. CHACHKES: Okay. How much time do we

15:40:55 **23** have left on the tape?

15:40:59 **24** THE VIDEOGRAPHER: 17.

15:41:00 **25** MR. CHACHKES: Why don't we just swap out
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15:41:02 **1** the tape and we don't have to take a break.

15:41:13 **2** (Recess from 3:41 p.m. to 4:01 p.m.)

16:02:00 **3** **Q.** (By Mr. Chachkes) Dr. Longo, the court

16:03:00 **4** reporter informed me that a couple of times I

16:03:01 **5** mispronounced EDXA as EDSA. Did you understand when

16:03:08 **6** I said EDSA to mean EDXA?

16:03:09 **7** **A.** Yes. Energy dispersive spectroscopy

16:03:12 **8** analysis is also well known.

9 **Q.** Okay.

16:03:14 **10** **A.** People have different acronyms for it, so

16:03:18 **11** it's fine. I think I was repeating what you were

16:03:20 **12** saying.

16:03:20 **13** **Q.** Okay. So is it your position that

16:03:24 **14** reporting analytical sensitivity by weight percent

16:03:27 **15** does not provide any useful information for

16:03:30 **16** determining potential airborne exposure to asbestos

16:03:32 **17** structures?

16:03:32 **18** **A.** Yes.

16:03:33 **19** **Q.** Is it your position that structures per

16:03:37 **20** gram data is the most useful for potential airborne

16:03:40 **21** exposure?

16:03:40 **22** **A.** Yes.

16:03:41 **23** **Q.** And in your report, in support of that

16:03:44 **24** proposition, you cite ISO 10312; correct?

16:03:50 **25** **A.** Correct. And it's in both of the ISO
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16:03:51 **1** methods.

16:03:51 **2** **Q.** Okay. ISO 10312 is a method for detecting

16:03:57 **3** asbestos in ambient air; correct?

16:03:58 **4** **A.** Correct.

16:03:59 **5** **Q.** Have you ever conducted air testing

16:04:02 **6** pursuant to the ISO 10312 method?

16:04:08 **7** **A.** In the past, yes.

16:04:10 **8** **Q.** Okay. How many times?

16:04:14 **9** **A.** I don't know.

16:04:15 **10** **Q.** Over ten?

16:04:16 **11** **A.** I don't know.

16:04:16 **12** **Q.** Over one?

16:04:18 **13** **A.** Most likely over one, but how big the

16:04:23 **14** bread box is, I don't know.

16:04:25 **15** **Q.** Okay. Did you test anything under the

16:04:30 **16** ISO 10312 method for this case, the MDL?

16:04:36 **17** **A.** Well, if you look at our report, we have

16:04:38 **18** referenced a number of TEM methods for the counting

16:04:40 **19** rules, including the two ISO methods, the ASTM

16:04:46 **20** method, the AHERA method. They all have the same

16:04:48 **21** counting rules for the determination of a regulated

16:04:51 **22** asbestos fiber. The ISO methods are referred back to

16:04:56 **23** in both the 22262-1 and -2 as the counting criteria

16:05:01 **24** for fibers and bundles.

16:05:03 **25** **Q.** Did you do an ISO 10312 ambient air test
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16:05:07 **1** for the purposes of this MDL?
 16:05:09 **2 A. No.**
 16:05:09 **3 Q.** And this ISO method involves collecting
 16:05:14 **4** air samples and testing for fibers; correct?
 16:05:17 **5 A. Correct.**
 16:05:17 **6 Q.** And you're not testing ambient air fibers
 16:05:19 **7** in this case, in this expert report?
 16:05:22 **8 A. No, we're not testing ambient air. But**
 16:05:25 **9 you have to understand once the asbestos gets on the**
 16:05:27 **10 filter, the -- and I know it sounds silly, but the**
 16:05:32 **11 asbestos fibers don't know if it came out of ambient**
 16:05:34 **12 air, if it came out of a water sample, came out of a**
 16:05:37 **13 dust sample, or it came out of a bulk sample like**
 16:05:40 **14 cosmetic talc. What's most important is the counting**
 16:05:43 **15 rules that are the same for all these different**
 16:05:47 **16 methods, as in the ISO 22262-2 for the TEM analysis**
 16:05:52 **17 of talc.**
 16:05:53 **18 Q.** You did not conduct an exposure assessment
 16:05:55 **19** for this case, did you?
 16:05:56 **20 A. I haven't conducted an exposure assessment**
 16:06:01 **21 with any MDL samples.**
 16:06:04 **22 Q.** You did employ ISO 22262; correct?
 16:06:08 **23 A. Yes.**
 16:06:08 **24 Q.** That does not include a formula for
 16:06:12 **25** reporting of data as structures per gram; correct?
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16:06:15 **1 A. That's correct.**
 16:06:15 **2 Q.** The --
 16:06:18 **3 A. Well, that's not quite true. If you go to**
 16:06:20 **4 the ISO TEM method that it references, it shows you**
 16:06:25 **5 how to report it in fibers or bundles per gram. So**
 16:06:30 **6 again, you have to look at the methodology that it**
 16:06:33 **7 references.**
 16:06:34 **8 Q.** Okay. So let me -- which ISO, 1, 2, 3 --
 16:06:39 **9** can you tell me -- are you referring to?
 16:06:40 **10 A. It's the 137 --**
 16:06:43 **11 Q.** ISO -- so it's part 1; correct?
 16:06:47 **12 A. Well, it's in both. It's in part 1 and**
 16:06:50 **13 part 2.**
 16:06:50 **14 Q.** Okay. So can you point to me in part 2
 16:06:54 **15** where -- and that's Exhibit 3 -- where it says --
 16:06:57 **16** that proper reporting is done in structures per gram?
 16:07:02 **17 A. Did you mark that as an exhibit?**
 16:07:08 **18 Q.** Exhibit 3, yeah. It's going to be down
 16:07:11 **19** from the beginning.
 16:07:13 **20 A. It's 1. Give me a second. I will in a**
 16:07:27 **21 second. I'm sure it's in this pile.**
 16:07:27 **22** MR. CIRSCH: It might be there.
 16:07:36 **23** THE WITNESS: There it is.
 16:07:40 **24 Q.** (By Mr. Chachkes) It should be Exhibit 3.
 16:07:41 **25** Okay.
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16:07:44 **1 A. So if you go to 16 --**
 16:07:51 **2** MR. CIRSCH: You're calling it Exhibit 3,
 16:07:53 **3** but it says on here Exhibit 5. I just want to
 16:07:56 **4** make sure that --
 16:07:57 **5** MR. CHACHKES: So Exhibit 3 should be
 16:08:01 **6** ISO-2?
 16:08:02 **7** MR. CIRSCH: It's got Exhibit 5 on it.
 16:08:03 **8 Q.** (By Mr. Chachkes) I'm sorry, I'm reading
 16:08:05 **9** my number wrong -- strike that. My 3 looked like --
 16:08:09 **10** totally my fault.
 16:08:10 **11** All right. Before you is Exhibit 5, which
 16:08:14 **12** is part 2 of the ISO 22262 standard. Can you point
 16:08:17 **13** to me where it requires reporting in structures per
 16:08:22 **14** gram?
 16:08:24 **15 A. If you go to 16.3, last paragraph before**
 16:08:33 **16 you get to 17, it says, If it is required to include**
 16:08:37 **17 all fiber sizes in the measurement, determination of**
 16:08:40 **18 mass fraction by TEM using 14.2.4 is the optimum**
 16:08:46 **19 analytical procedure.**
 16:08:47 **20 If you go to 14.2.4 -- 14.2.4.4,**
 16:09:12 **21 Preparation of specimens for SEM or TEM observation,**
 16:09:17 **22 then it references back to the ISO 13794.**
 16:09:22 **23 Q.** Okay. So you -- it's your understanding
 16:09:25 **24** that the ISO 22262 -- so first of all, the ISO 22262
 16:09:31 **25** -2, putting aside cross-references, itself doesn't
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16:09:36 **1** have a formula for reporting data as structures per
 16:09:39 **2** gram; correct?
 16:09:40 **3 A. That is correct.**
 16:09:40 **4 Q.** Okay.
 16:09:41 **5 A. And it doesn't have the formula for**
 16:09:43 **6 calculating weight percent. It points you back to**
 16:09:48 **7 the ISO TEM protocols.**
 16:09:51 **8 Q.** Okay. And then the reference to 14.2.4,
 16:09:55 **9** that section is entitled, Determination of asbestos
 16:10:00 **10** weight mass fraction from fiber measurement made by
 16:10:03 **11** PLM, SEM, or TEM.
 16:10:04 **12** That's the title; right?
 16:10:06 **13 A. Correct.**
 16:10:06 **14 Q.** Okay. I just want to do a little walk
 16:10:11 **15** through one of the calculations you made so I can
 16:10:13 **16** figure it out.
 16:10:14 **17** Can I have the exhibits? Mark this as
 16:10:17 **18** Exhibit 19.
 16:10:17 **19** (Defendants' Exhibit 19 was marked for
 16:10:17 **20** identification.)
 16:10:48 **21 Q.** (By Mr. Chachkes) Okay. Can you tell me
 16:10:51 **22** just on a high level what this spreadsheet,
 16:10:52 **23** Exhibit 19, is meant to represent?
 16:10:53 **24 A. This represents the weight of the sample**
 16:10:54 **25 that was used, it represents the weight of the sample**
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16:10:59 **1** analyzed per grid opening, it tells you what the
16:11:04 **2** filter size was, it tells you how many regulated
16:11:06 **3** asbestos structures, and then it gives you the
16:11:08 **4** calculation of how many asbestos structures per gram,
16:11:15 **5** which if you're doing weight percent, you have to do
16:11:18 **6** all the same -- get all the same information, but
16:11:22 **7** instead of stopping at the number of structures per
16:11:26 **8** gram, then you go through the calculation to
16:11:29 **9** determine the weight of each of the structures and
16:11:33 **10** then calculate a mass weight percent.
16:11:35 **11** Q. Okay. So in Exhibit 19, I guess, on the
16:11:40 **12** upper left I see a .03135. That's the initial weight
16:11:46 **13** prior to concentration method, or is that after
16:11:51 **14** concentration?
16:11:52 **15** A. That is the weight prior to the
16:11:54 **16** concentration method.
16:11:55 **17** Q. Okay. So that's basically the
16:12:00 **18** unconcentrated weight that you are trying to
16:12:02 **19** determine how many structures are in there?
16:12:05 **20** A. Correct.
16:12:07 **21** Q. And you use a Sartorius scale; right?
16:12:14 **22** A. That's correct.
16:12:14 **23** Q. Does it have that many significant digits?
16:12:16 **24** A. It does.
16:12:17 **25** Q. Okay. Does it have more than that, or is
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16:12:19 **1** that it?
16:12:20 **2** A. Let's see. One, two, three, four, five.
16:12:24 **3** I think it has six.
16:12:26 **4** Q. Okay. But you only report five
16:12:29 **5** significant digits; correct?
16:12:31 **6** A. Correct.
16:12:31 **7** Q. And then your analysts conduct heavy
16:12:38 **8** liquid density separation; right?
16:12:40 **9** A. Correct.
16:12:40 **10** Q. After separation you have basically an
16:12:42 **11** amphibole sludge and with much of the talc removed?
16:12:48 **12** A. Correct.
16:12:48 **13** Q. And what is the percentage of talc from
16:12:53 **14** amphibole separation your analysts achieve in this
16:12:56 **15** analysis?
16:12:57 **16** A. We haven't measured that.
16:12:58 **17** Q. Do you have the data and just didn't put
16:13:04 **18** it on the sheet, or you just -- you don't even have
16:13:05 **19** the data?
16:13:05 **20** A. We don't measure the amount that we
16:13:07 **21** removed.
16:13:08 **22** Q. Okay. Is there a way to calculate it?
16:13:12 **23** MR. CIRSCH: Object to form.
16:13:13 **24** THE WITNESS: Not without making the
16:13:15 **25** measurement, no.
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16:13:15 **1** Q. (By Mr. Chachkes) If you're analyzing two
16:13:17 **2** samples and sample A contains more amphiboles than
16:13:21 **3** sample B, would you expect that following the
16:13:25 **4** concentration there would be more products separated
16:13:27 **5** out from A than B?
16:13:29 **6** A. I don't know if you can measure that. If
16:13:32 **7** it contains more amphibole fibers in the final
16:13:37 **8** supernate, then you would have more fibers that you
16:13:41 **9** counted.
16:13:42 **10** Q. And by supernate, that's kind of a synonym
16:13:47 **11** for amphibole sludge --
16:13:49 **12** A. Well, it's the pellet. Whatever has gone
16:13:52 **13** down to the bottom of the centrifuge tube, any
16:13:56 **14** potential amphiboles, some talc particles, you always
16:14:00 **15** see talc particles, so it's not 100 percent
16:14:03 **16** efficient.
16:14:03 **17** Q. The supernate's the solids that are left
16:14:06 **18** over after the concentration?
16:14:07 **19** A. Correct.
16:14:08 **20** Q. So you can't say that if one sample has
16:14:10 **21** more amphiboles than another that there will be more
16:14:13 **22** supernate in the former than the latter?
16:14:17 **23** A. You would expect -- if it has more in
16:14:19 **24** there you would expect more, but it's pretty tough to
16:14:22 **25** make that determination before you measure it.
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16:14:24 **1** Q. Yeah, I'm not asking you for a
16:14:26 **2** calculation. I'm just saying just seems like common
16:14:29 **3** sense if you've got more to concentrate out, you'll
16:14:33 **4** get more concentrate.
16:14:34 **5** MR. CIRSCH: Object to form.
16:14:35 **6** THE WITNESS: All things being equal,
16:14:37 **7** that's correct.
16:14:38 **8** Q. (By Mr. Chachkes) Okay. After separation
16:14:38 **9** you did not weigh the centrifuge that remained -- you
16:14:42 **10** did not weigh the supernate that remained after
16:14:48 **11** desiccation; correct?
16:14:49 **12** A. That's correct.
16:14:50 **13** Q. And I see a number, weight of sample
16:14:56 **14** analyzed; do you see that there?
16:14:58 **15** A. Correct.
16:14:58 **16** Q. That's more significant digits than in the
16:15:02 **17** initial weight; correct?
16:15:06 **18** A. That's correct. You take the amount that
16:15:07 **19** has theoretically gone down onto the filter, what you
16:15:12 **20** start with, so that if you have 31.35, then you
16:15:18 **21** calculate what's on the overall filter, and then you
16:15:20 **22** calculate how many grid openings you look at, then
16:15:23 **23** it's just the math.
16:15:24 **24** Q. Yeah, now my question is just about
16:15:25 **25** significant digits. You understand why significant
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16:15:28 **1** digits are important; right?

16:15:29 **2 A. Yeah, but that's a mathematical**

16:15:33 **3 determination of significant digits.**

16:15:34 **4 Q.** Right. Significant digits are important

16:15:37 **5** because if I have a number with three significant

16:15:40 **6** digits multiplied times a number with four

16:15:45 **7** significant digits, the result should be reflecting

16:15:51 **8** the least number of significant digits that went into

16:15:53 **9** the equation; correct?

16:15:55 **10** MR. CIRSCH: Object to form.

16:15:56 **11** THE WITNESS: You can do it that way if

16:15:57 **12** you like, or you can put it out to the

16:15:59 **13** significant digits and then round it.

16:16:01 **14 Q.** (By Mr. Chachkes) Okay. Shouldn't you

16:16:04 **15** have rounded the weight of the sample analyzed

16:16:06 **16** because you've got more significant digits -- you've

16:16:08 **17** got more digits than there are significant digits?

16:16:10 **18 A. No. It's a mathematical -- it's a**

16:16:13 **19 mathematical equation or just simply dividing it on**

16:16:18 **20 how much of the original sample would cover the**

16:16:21 **21 filter.**

16:16:22 **22 Q.** Okay. You've got a -- I'm going to phrase

16:16:25 **23** this a different way.

16:16:26 **24** You've got a greater precision in your

16:16:29 **25** weight of sample analyzed than you do with the
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16:16:31 **1** precision of the numbers that went into it?

16:16:35 **2** MR. CIRSCH: Object to form.

16:16:36 **3** THE WITNESS: I don't think it's any more

16:16:38 **4** precision. It's taking the weight and dividing

16:16:40 **5** it onto the filter, and then from the filter

16:16:43 **6** you're looking at a number of area by 100 grid

16:16:45 **7** openings, so you're calculating what the weight

16:16:48 **8** would be if you put the whole -- to go back to

16:16:52 **9** the sample to determine the amount of fibers.

16:16:55 **10** That's just the way it's done.

16:16:56 **11 Q.** (By Mr. Chachkes) Does your Sartorius

16:16:59 **12** scale have the capability of measuring a sample down

16:17:01 **13** to .00017187 grams?

16:17:05 **14 A. Not the Sartorius, but we do have a**

16:17:08 **15 microbalance, but that's not how this is done.**

16:17:11 **16 Q.** So the -- this is just a yes or no. The

16:17:18 **17** weight of sample analyzed is a number that is a

16:17:24 **18** calculation; right?

16:17:26 **19** MR. CIRSCH: Object to form.

16:17:26 **20** THE WITNESS: Yes.

16:17:28 **21 Q.** (By Mr. Chachkes) Okay. And the

16:17:29 **22** structures per gram of sample, that's also a number

16:17:31 **23** that's calculated; right?

16:17:34 **24 A. That's correct.**

16:17:34 **25 Q.** And what's the equation to get me the
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16:17:42 **1** weight of sample analyzed?

16:17:44 **2 A. Well, you go back to the individual**

16:17:46 **3 structures and you multiply the length by the width**

16:17:52 **4 squared times the density of the particular type of**

16:17:56 **5 amphibole times pi. And then all those are added up,**

16:17:59 **6 and then you then go from the adding that up to what**

16:18:03 **7 the overall weight would be on the filter.**

16:18:05 **8 Q.** Okay. And the weight of sample analyzed

16:18:10 **9** is for one grid opening, ten grid openings, 100 grid

16:18:16 **10** openings? What is it?

16:18:17 **11 A. That's, as I believe, that's one grid**

16:18:19 **12 opening.**

16:18:19 **13 Q.** Okay. So if you wanted to extrapolate,

16:18:25 **14** putting aside --

16:18:26 **15 A. I may be wrong on that. I have to check**

16:18:29 **16 that. I think it's all 100.**

16:18:30 **17 Q.** Okay, if that's all 100. Now, that's what

16:18:37 **18** percentage of the total supernate?

16:18:38 **19 A. We haven't measured the total supernate.**

16:18:41 **20 We measure what we start with because the**

16:18:43 **21 calculations go back to what you start with. We**

16:18:46 **22 don't measure the supernate.**

16:18:48 **23 Q.** What percentage of what you started with

16:18:50 **24** is it?

16:18:51 **25 A. We started with 31 milligrams, and that is**
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16:19:03 **1 0.17. Well, we started with 0.3135 grams, and that**

16:19:10 **2 is .00017187 grams. So just divide the two.**

16:19:15 **3 Q.** So is there any need to extrapolate here,

16:19:22 **4** or is 100 percent of the supernate being looked at?

16:19:26 **5 A. You're putting 100 percent of the**

16:19:31 **6 supernate down onto the filter.**

16:19:32 **7 Q.** And that's 100 grid openings?

16:19:34 **8 A. Well, the filter is 201 millimeters**

16:19:38 **9 squared. That's the filter where the material is put**

16:19:41 **10 through the filter to collect it.**

16:19:43 **11 And then you're looking at 100 grid**

16:19:45 **12 openings. So 100 grid openings is 1.1 millimeter.**

16:19:50 **13 So 1.1 millimeter of the 201 millimeters will now**

16:19:54 **14 give you the percentage of what you're looking at on**

16:19:56 **15 that filter.**

16:19:57 **16 Q.** Why are you calculating that percentage?

16:20:02 **17** Isn't 100 percent of what comes through the filter in

16:20:05 **18** the grid openings -- in the 100 grid openings?

16:20:07 **19** MR. CIRSCH: Object to form.

16:20:08 **20** THE WITNESS: No.

16:20:08 **21 Q.** (By Mr. Chachkes) Okay.

16:20:09 **22 A. Can I draw on something?**

16:20:11 **23 Q.** Yeah.

16:20:13 **24 A. The filter is much bigger than 100 grid**

16:20:15 **25 openings.**
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16:20:16 **1** Q. Let me just -- here --
16:20:18 **2** MR. CIRSCH: Here you go.
16:20:22 **3** MR. CHACHKES: That would be great. Thank
16:20:22 **4** you.
16:20:22 **5** THE WITNESS: So if you have a filter
16:20:23 **6** that's this big -- that's not bad -- and then
16:20:27 **7** your grids are 3 millimeters. So -- shall I
16:20:34 **8** make a happy face here?
16:20:36 **9** Q. (By Mr. Chachkes) Please don't.
16:20:37 **10** A. So each one of these grid openings -- and
16:20:46 **11** I'm blowing it up.
16:20:50 **12** So you're taking 7 millimeter plugs and
16:20:53 **13** then each grid opening has 100 grids that are 100 by
16:20:57 **14** 100 microns, typically. So the material is going on
16:21:01 **15** this whole filter, and then you're just taking
16:21:04 **16** sections of the filter out for your TEM grids.
16:21:07 **17** MR. CHACHKES: I see.
16:21:08 **18** So can we just mark this as an exhibit,
16:21:12 **19** Exhibit 20, please.
16:21:13 **20** (Defendants' Exhibit 20 was marked for
21 identification.)
16:21:19 **22** THE WITNESS: I didn't know you were going
16:21:21 **23** to mark it.
16:21:21 **24** Q. (By Mr. Chachkes) You did know I was
16:21:23 **25** going to mark it.
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16:21:24 **1** A. That's true.
16:21:26 **2** Q. So what you've drawn in Exhibit 20 -- so I
16:21:31 **3** just want to get my vocabulary correct -- that the
16:21:33 **4** filter size is the big white circle in which you've
16:21:35 **5** got the three dots, that's the -- thank you for
16:21:35 **6** marking that.
16:21:35 **7** A. Filter, which is 201 millimeters squared.
16:21:41 **8** Q. Got it.
16:21:42 **9** A. And that's the filtration area so you're
16:21:46 **10** always -- because it's in a device that holds it,
16:21:49 **11** it's not the whole size of the filter, but it's
16:21:52 **12** actually the area where filtrate is going down
16:21:55 **13** through it.
16:21:56 **14** Q. Right. Okay.
16:21:56 **15** MR. CIRSCH: You're pulling those numbers
16:21:57 **16** from Exhibit 19; correct?
16:21:59 **17** THE WITNESS: Yes. It's the same size for
16:22:00 **18** every one.
16:22:01 **19** MR. CHACHKES: And if you would not
16:22:03 **20** comment.
16:22:04 **21** Q. (By Mr. Chachkes) And the black dots that
16:22:05 **22** you have there, those are the grid openings?
16:22:08 **23** A. Those are the grids.
16:22:09 **24** Q. Okay.
16:22:09 **25** A. So a grid -- and this has been blown up --
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16:22:17 **1** is approximately 3 millimeters in diameter. Now, on
16:22:23 **2** this grid are openings.
16:22:24 **3** Q. Okay.
16:22:24 **4** A. And each one of these openings looks like
16:22:35 **5** this, and they are 100 micrometers in width in two
16:22:47 **6** directions. So when you look at a grid opening,
16:22:49 **7** you're looking in this area.
16:22:51 **8** Q. Okay. And I apologize for repeating it a
16:22:56 **9** little bit, but the -- just want to make sure the
16:22:59 **10** transcript's clear to correspond with the picture.
16:23:02 **11** You've got drawn, it looks like a circle
16:23:06 **12** with three black dots, that's the filter, and in the
16:23:09 **13** filter there are -- those black dots are grids;
16:23:12 **14** correct? So far correct?
16:23:13 **15** A. So far correct.
16:23:14 **16** Q. Okay. And how many grids -- I know your
16:23:17 **17** picture only has three, but how many grids are
16:23:20 **18** actually in your filter in the lab?
16:23:22 **19** A. We make three grids.
16:23:24 **20** Q. Oh, so there are three grids?
16:23:26 **21** A. Correct.
16:23:27 **22** Q. And then you've drawn a couple arrows to
16:23:29 **23** emphasize what the grid is, and the grid has got
16:23:32 **24** basically a bunch of grid openings and that's 100
16:23:34 **25** grid openings?
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16:23:35 **1** A. Correct.
16:23:36 **2** Q. Okay. And each grid opening is, you said,
16:23:39 **3** 10 micrometers?
16:23:40 **4** A. 100 micrometers.
16:23:41 **5** Q. 100 micrometers. Got it.
16:23:43 **6** A. 100 micrometers, essentially a square, 100
16:23:49 **7** micrometers for each XY dimension.
16:23:51 **8** Q. Okay. And when you extrapolate filters --
16:23:59 **9** if the fibers you find in the filters back to the
16:24:03 **10** original weight of the sample, can you just walk me
16:24:06 **11** through that in conceptual terms?
16:24:08 **12** A. In conceptual terms, you know the area
16:24:12 **13** you've analyzed by the grid openings. You know the
16:24:15 **14** area of your filter, and you take the -- you
16:24:20 **15** determine the ratio of the amount of material on the
16:24:25 **16** filter and then go to the amount of material that
16:24:28 **17** would be on each grid opening, and then you take the
16:24:32 **18** number of fibers you have and then you
16:24:36 **19** back-calculate.
16:24:36 **20** So if I have three fibers in a known
16:24:39 **21** amount, and that amount is some percentage of the
16:24:43 **22** overall amount that I know that in the overall amount
16:24:46 **23** on the filter, this is how many fibers and bundles
16:24:52 **24** would be there because you have to assume a
16:24:56 **25** homogenous distribution on the filter.
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16:24:58 **1** Q. And do you look at the -- for your fiber
16:25:05 **2** count, do you look at each of the three grids?
16:25:08 **3** A. We keep one for archive; we look at two
16:25:11 **4** grids and 50 openings on each grid.
16:25:13 **5** Q. Okay. And why only 50 openings on each
16:25:18 **6** grid?
16:25:18 **7** A. Well, typically the standard protocols,
16:25:23 **8** the peer-reviewed protocols, usually state two grid
16:25:28 **9** openings -- two grids, and so we put 50 on one and 50
16:25:33 **10** on the other.
16:25:34 **11** Q. Why not 100 on one and 100 on the other?
16:25:37 **12** A. Well, that would take twice as much time.
16:25:40 **13** And you could do that, or you could look at 300. It
16:25:45 **14** doesn't change anything other than reduce your --
16:25:48 **15** increase your analytical sensitivity.
16:25:50 **16** Q. Okay. Does the ISO 22262-2 lay out this
16:26:00 **17** math for extrapolating from looking at a grid?
16:26:05 **18** A. No. It referenced the protocols. All TEM
16:26:11 **19** analyses -- air sample, water sample, bulk sample --
16:26:15 **20** is done in this manner. All analytical chemistry is
16:26:19 **21** done in this manner.
16:26:20 **22** If you take a gallon of water out of Lake
16:26:24 **23** Michigan and you want to determine the amount of lead
16:26:26 **24** in there, for example, hypothetical, you don't
16:26:28 **25** measure the whole gallon, you measure, typically, a
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16:26:32 **1** couple of milliliters of the material and then you
16:26:34 **2** extrapolate back on the overall concentration that
16:26:37 **3** would be there.
16:26:38 **4** The ISO TEM air sample method is the same
16:26:40 **5** way. You're analyzing it and you find 4 or 5 fibers
16:26:46 **6** in the grid opening, you're extrapolating back to
16:26:49 **7** what is in the air samples.
16:26:51 **8** Q. Okay. Now, when you said the
16:26:57 **9** peer-reviewed literature suggests looking at two of
16:27:00 **10** the grids, can you give me an example of some such
16:27:05 **11** literature?
16:27:05 **12** A. Well, there's lots of peer-reviewed
16:27:07 **13** literature that used the standard protocols. If you
16:27:09 **14** look at the AHERA, you look at ISO, you look at the
16:27:12 **15** NIOSH 7402, you look at the PCM, anything that has to
16:27:18 **16** do with TEM, you have two grid openings. The 7402
16:27:23 **17** says 40 openings among two grids.
16:27:28 **18** If you have a high number of fibers, then
16:27:31 **19** you may stop on your second opening on one grid and
16:27:34 **20** then go to the second grid. So the protocols
16:27:38 **21** themselves state that.
16:27:39 **22** Q. Okay. Your analysts employed ISO 22262-2
16:27:44 **23** to test for asbestos by TEM; is that correct?
16:27:46 **24** A. Yes.
16:27:47 **25** Q. And they use TEM to identify the particles
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16:27:55 **1** morphologically as asbestos; is that correct?
16:27:58 **2** MR. CIRSCH: Object to form.
16:27:59 **3** THE WITNESS: They use TEM to identify
16:28:01 **4** regulated asbestos using morphology, EDXA and
16:28:08 **5** SAED.
16:28:09 **6** Q. (By Mr. Chachkes) Okay. So is there a
16:28:10 **7** phrase that I can use that's not confusing to refer
16:28:12 **8** to the visual aspect of TEM that's not, you know,
16:28:16 **9** SAED or the other more different techniques?
16:28:19 **10** A. Well, if you say all the counting rules
16:28:21 **11** for all the standard TEM methods that is not the
16:28:26 **12** occupational exposure counting rules, they will all
16:28:30 **13** state the same thing.
16:28:31 **14** Q. No, I'm just looking for a -- I want to
16:28:33 **15** make sure we're speaking a common language, the
16:28:36 **16** visual --
16:28:37 **17** A. How about just counting rules?
16:28:38 **18** Q. Well, we disagree as to what the counting
16:28:40 **19** rules require.
16:28:41 **20** So if I say the visual aspect of TEM as
16:28:46 **21** opposed to the SAED and -- what do you call it when
16:28:57 **22** you take a picture with the TEM?
16:28:59 **23** MR. CIRSCH: Object to form.
16:29:00 **24** THE WITNESS: Photomicrograph.
16:29:01 **25** Q. (By Mr. Chachkes) Okay. So they use
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16:29:02 **1** photomicrographs to determine -- from the TEM to
16:29:05 **2** determine morphology?
16:29:06 **3** A. No. They use the counting rules to
16:29:08 **4** determine morphology, that it has parallel sides,
16:29:12 **5** it's greater than .5 micrometers in length, it has at
16:29:15 **6** least a 5-to-1 aspect ratio, and the chemistry in
16:29:20 **7** SAED determines it to be a regulated asbestos, then
16:29:23 **8** it's a regulated asbestos fiber.
16:29:25 **9** Q. I didn't ask what you look at to determine
16:29:28 **10** whether it's asbestos or not.
16:29:29 **11** What do you -- what physically are you
16:29:33 **12** looking at to determine morphology? It's the
16:29:35 **13** photomicrograph; right?
16:29:37 **14** MR. CIRSCH: Object to form.
16:29:37 **15** THE WITNESS: No. We're visually looking
16:29:40 **16** through the microscope. And I'll use an
16:29:42 **17** example. I'm looking at a magnification of
16:29:46 **18** approximately 20,000 times, and in my field of
16:29:49 **19** view a structure looking like this pen shows up.
16:29:55 **20** The first thing I do is look at it and say
16:29:57 **21** does it have parallel sides? The answer is yes.
16:30:00 **22** We have calibration standards and go is it
16:30:03 **23** greater than .5 micrometers in length? Yes.
16:30:08 **24** Does it have an aspect ratio of greater than
16:30:11 **25** 5-to-1? I can visually see that, but we take a
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16:30:14 **1** photomicrograph -- it's close -- to make sure.
16:30:16 **2 Q.** (By Mr. Chachkes) So you use visual
16:30:18 **3** inspection through the TEM to determine morphology?
16:30:22 **4** MR. CIRSCH: Object to form.
16:30:23 **5** THE WITNESS: With the counting rules,
16:30:26 **6** that is correct.
16:30:27 **7 Q.** (By Mr. Chachkes) Okay. Well, it doesn't
16:30:29 **8** matter what the counting rules are. If you want to
16:30:32 **9** look at -- if you want to just see the morphology,
16:30:34 **10** you use visual inspection?
16:30:36 **11** MR. CIRSCH: Object to form.
16:30:36 **12** THE WITNESS: The first thing we do is
16:30:38 **13** look at it and if it has parallel sides and does
16:30:42 **14** it meet the counting rules where this is an
16:30:47 **15** elongated particle, that deserves further
16:30:51 **16** examination.
16:30:51 **17 Q.** (By Mr. Chachkes) Can you tell me where
16:30:53 **18** in ISO 22262 it provides -- directs you to look at
16:31:01 **19** morphology under TEM?
16:31:03 **20 A.** **I did. I gave you the ISO standard for**
16:31:06 **21 TEM and indirect prep, and in order to determine what**
16:31:11 **22 your weight percent is, you have to determine if it**
16:31:14 **23 is parallel sides, greater than .5 micrometers in**
16:31:17 **24 length, and so on and so forth.**
16:31:19 **25 Not all methods replicate previous**
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16:31:22 **1 methods. ISO 22262-2 does not put the entire**
16:31:28 **2 counting protocol in there. It directs you to the**
16:31:30 **3 TEM method where you have all these methodology to do**
16:31:36 **4 that.**
16:31:36 **5 Q.** Okay. So it's not, per se, in 22262, but
16:31:40 **6** you're saying there's a reference to another ISO
16:31:44 **7** standard which you say requires visual inspection
16:31:49 **8** under TEM to determine morphology?
16:31:52 **9** MR. CIRSCH: Object to form.
16:31:53 **10** THE WITNESS: Well, per se it doesn't
16:31:55 **11** replicate the entire procedure. That's how
16:31:57 **12** these standards work.
16:31:59 **13** Once it has a document, in this case,
16:32:03 **14** another ISO document that lays out all the
16:32:06 **15** procedures and practices for how to identify
16:32:09 **16** regulated asbestos, it just goes back to that.
16:32:13 **17 Q.** (By Mr. Chachkes) So --
16:32:14 **18 A.** **ASTM is the same way, and the definition**
16:32:17 **19 of asbestos fibers in ASTM has another document that**
16:32:20 **20 tells you all the different definitions. One builds**
16:32:25 **21 on the other.**
16:32:26 **22 Q.** Okay. Just looking at 22262, there is a
16:32:28 **23** section in there under part 1 that is labeled
16:32:33 **24** Morphology; right?
16:32:47 **25** Exhibit 4 is the one that's part 1?
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16:32:49 **1 A.** **Oh, part 1, I'm sorry.**
16:32:51 **2 Q.** Yeah. I'll just direct your attention to
16:33:05 **3** 7.2. -- on page 22.
16:33:22 **4** So there's a section on page 22 which has
16:33:26 **5** the heading Morphology; correct?
16:33:28 **6 A.** **That is correct. 7.2.3.7.1. I'm**
16:33:32 **7 surprised you didn't know that.**
16:33:34 **8 Q.** I did, actually.
16:33:36 **9** And the only heading, as far as you know,
16:33:41 **10** in the ISO 22262 parts that actually says morphology
16:33:47 **11** is this one? Or do you not know? I don't want to
16:33:51 **12** spend all day on that one.
16:33:52 **13** MR. CIRSCH: Form.
16:33:53 **14** THE WITNESS: Well, this is a PLM
16:33:54 **15** analysis. This is not TEM analysis. And ISO
16:33:56 **16** has their PLM analysis setup, and these are the
16:34:01 **17** counting rules of what you do when you're
16:34:03 **18** analyzing under a polarized light microscope
16:34:05 **19** versus a transmission electron microscope.
16:34:07 **20 Q.** (By Mr. Chachkes) Did you use PLM to
16:34:12 **21** identify the morphology of the fibers you found in
16:34:15 **22** the MDL?
16:34:16 **23** MR. CIRSCH: Object to form.
16:34:19 **24** THE WITNESS: Well, that's worded -- and I
16:34:20 **25** apologize. That's worded poorly.
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16:34:22 **1** For our ISO 22262-1 PLM analysis, yes. We
16:34:28 **2** went through, and each of these regulated
16:34:32 **3** asbestos fibers that we have in there in
16:34:34 **4** pictures follow this morphology.
16:34:37 **5 Q.** (By Mr. Chachkes) Okay. In your reports
16:34:43 **6** you write on page 12, Amphibole fibers or bundles
16:34:49 **7** with substantially parallel sides and an aspect ratio
16:34:53 **8** of 5-to-1 or greater and at least half a micrometer
16:34:56 **9** in length were counted as regulated asbestos fibers
16:35:00 **10** and bundles per the standard TEM counting rules
16:35:03 **11** described by -- and then you cite six methods. Are
16:35:07 **12** you with me so far?
16:35:08 **13 A.** **I am.**
16:35:08 **14 Q.** Which is the method you actually use?
16:35:12 **15 A.** **Well, can't really point to any one method**
16:35:15 **16 because they all have the same counting rules.**
16:35:17 **17 Q.** Okay.
16:35:27 **18 A.** **What page was that?**
16:35:28 **19 Q.** I was just talking about page 12 of your
16:35:31 **20** January 15.
16:35:32 **21 A.** **I think it states that.**
16:35:35 **22 This is for, again, TEM. And every one of**
16:35:45 **23 those TEM methods have those counting rules, so I**
16:35:48 **24 referenced them all.**
16:35:50 **25** MR. CHACHKES: So I'm going to mark as the
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16:35:51 **1** next exhibit ISO 13794. We are on Exhibit 21.
16:36:02 **2** (Defendants' Exhibit 21 was marked for
16:36:25 **3** identification.)
16:36:25 **4** **Q.** (By Mr. Chachkes) So we spoke a little
16:36:26 **5** bit before about what's been marked as Exhibit 21;
6 right?
16:36:31 **7** **A.** **Yes, sir, we have.**
16:36:32 **8** **Q.** Okay. And going to the seventh page in
16:36:41 **9** section 1, Scope. Section -- we're here.
16:36:55 **10** **A.** **What page? ?? Did you say ??**
16:36:59 **11** **Q.** Actually, strike that.
16:37:00 **12** I'm sorry. So it was the seventh page of
16:37:05 **13** the PDF, so let's strike that and start again.
16:37:09 **14** Going to what's numbered in the exhibit as
16:37:11 **15** page 1, going to the heading 1, this is Scope; right?
16:37:17 **16** It's the scope of the ISO standard?
16:37:19 **17** **A.** **Correct.**
16:37:20 **18** **Q.** Okay. Subsection 1.1, which is substance
16:37:24 **19** determined; do you see that?
16:37:25 **20** **A.** **I do.**
16:37:26 **21** **Q.** And then you see at the last sentence, The
16:37:30 **22** method cannot discriminate between individual fibers
16:37:33 **23** of asbestos and nonasbestos analogs of the same
16:37:36 **24** amphibole mineral.
16:37:36 **25** Do you see that?
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16:37:37 **1** **A.** **I do.**
16:37:37 **2** **Q.** Do you agree with ISO 13794 that this
16:37:43 **3** method cannot discriminate between individual fibers
16:37:46 **4** of the asbestos and nonasbestos analogs of the same
16:37:50 **5** amphibole material?
16:37:50 **6** **A.** **Yes and no. If you're analyzing samples**
16:37:56 **7** **over and over from the same source and you're seeing**
16:38:01 **8** **both what people will clearly say is asbestiform**
16:38:08 **9** **bundles and you have some individual fibers in there,**
16:38:11 **10** **in my opinion you can discriminate against that.**
16:38:12 **11** **If I was looking at one fiber and I didn't**
16:38:15 **12** **have any information about it and hadn't analyzed**
16:38:18 **13** **sample after sample, I would say that one fiber, it's**
16:38:24 **14** **asbestos, it's asbestiform because it's formed like**
16:38:28 **15** **asbestos, but, no, it does not meet the geological**
16:38:31 **16** **definition for asbestos, high tensile strength,**
16:38:36 **17** **flexible, and so on and so forth.**
16:38:39 **18** **But to me, asbestiform means that it is**
16:38:42 **19** **fibrous like asbestos; I would call it asbestiform.**
16:38:45 **20** **Q.** So it's your understanding when -- in this
16:38:49 **21** exhibit, in this ISO standard, when it says it can't
16:38:52 **22** discriminate between asbestos and nonasbestos
16:38:54 **23** analogs, it's referring to geological definitions and
16:39:00 **24** not regulatory definitions; is that your testimony?
16:39:02 **25** **MR. CIRSCH: Object to form.**
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16:39:03 **1** THE WITNESS: Well, it is regulatory. If
16:39:05 **2** it -- even though it cannot discriminate, you
16:39:07 **3** have to count it, and it is a regulated asbestos
16:39:10 **4** fiber if you decide it's asbestiform or not. It
16:39:14 **5** does not allow you to discriminate between the
16:39:16 **6** two as long as it meets the counting rules. It
16:39:18 **7** is regulated.
8 **Q.** (By Mr. Chachkes) Okay.
16:39:19 **9** **A.** **Now, we can argue over back and forth if**
16:39:21 **10** **it is asbestiform or not. But make no mistake, it is**
16:39:24 **11** **a regulated asbestos fiber if it meets the counting**
16:39:27 **12** **rules.**
16:39:28 **13** **Q.** Okay. So you're saying that something can
16:39:31 **14** meet the counting rules, be regulated, but it might
16:39:34 **15** be the non -- you might be counting nonasbestos
16:39:37 **16** analogs?
16:39:38 **17** **MR. CIRSCH: Object to form.**
16:39:39 **18** **THE WITNESS: It's not nonasbestos.**
16:39:42 **19** **It's --**
16:39:42 **20** **Q.** (By Mr. Chachkes) I'm using the phrase
16:39:44 **21** in --
16:39:44 **22** **A.** **It is not nonasbestos. If it meets all**
16:39:46 **23** **the counting rules, it's a regulated asbestos fiber.**
16:39:49 **24** **That's my position on that.**
16:39:50 **25** **Q.** Okay. In this last sentence of 1.1, it
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16:39:55 **1** makes a distinction between asbestos and nonasbestos
16:39:57 **2** analogs; do you see that?
16:39:58 **3** **A.** **I see that.**
16:39:59 **4** **Q.** That's black and white; right?
16:40:00 **5** **MR. CIRSCH: Object.**
16:40:01 **6** **THE WITNESS: That's what it states.**
16:40:02 **7** **Q.** (By Mr. Chachkes) Okay. So tell me what
16:40:04 **8** asbestos versus nonasbestos analogs mean in
16:40:09 **9** ISO 13794.
16:40:09 **10** **MR. CIRSCH: Object to form.**
16:40:10 **11** **THE WITNESS: They don't really define it**
16:40:12 **12** **other than to say it may not.**
16:40:13 **13** **In my opinion, if it is fibrous,**
16:40:16 **14** **asbestiform, fibrous like asbestos-form, it is**
16:40:20 **15** **asbestiform.**
16:40:21 **16** **Q.** (By Mr. Chachkes) Yeah, but what I want
16:40:23 **17** is can you make any -- reading -- looking at that
16:40:27 **18** sentence, there's a clear distinction between
16:40:30 **19** asbestos and nonasbestos analogs. What's the
16:40:32 **20** difference?
16:40:33 **21** **It doesn't matter what you think. What is**
16:40:34 **22** **the ISO -- what distinction are they making? Or you**
16:40:37 **23** **just can't say?**
16:40:38 **24** **MR. CIRSCH: Object to form.**
16:40:38 **25** **THE WITNESS: It's not that they don't**
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16:40:40 **1** say. They don't tell you how to determine
16:40:41 **2** between, quote, this nonasbestos -- this
16:40:44 **3** nonasbestiform versus asbestiform. There is no
16:40:50 **4** method for doing that.
16:40:52 **5** **Q.** (By Mr. Chachkes) Okay. Is it your
16:40:53 **6** opinion because they don't give a definition of the
16:40:56 **7** distinction, they really didn't mean that
16:40:59 **8** distinction?
16:40:59 **9** **A.** **I can't say what the --**
16:41:01 **10** MR. CIRSCH: Object to form.
16:41:02 **11** THE WITNESS: -- what Eric Chatfield had
16:41:05 **12** in mind when he said that.
13 **Q.** (By Mr. Chachkes) Okay.
16:41:07 **14** **A.** **But in the protocol, what I look at as a**
16:41:09 **15** **scientist, and we look at these protocols, what does**
16:41:13 **16** **it say to make the determination between the two? It**
16:41:17 **17** **doesn't give you any information. Same thing with**
16:41:19 **18** **the whole asbestiform, high tensile strength,**
16:41:23 **19** **et cetera.**
16:41:24 **20** **But we have the ability now, we have**
16:41:26 **21** **analyzed so many samples and have analyzed so many**
16:41:30 **22** **regulated asbestos fibers and bundles that we have**
16:41:34 **23** **enough information if that is really at issue that**
16:41:37 **24** **these are all asbestiform.**
16:41:40 **25** **But no matter if you want to argue that**
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16:41:42 **1** **it's not, it is, for single fibers, it's all**
16:41:45 **2** **regulated asbestos fibers per these protocols.**
16:41:47 **3** **Q.** Yeah, you've already said that a number of
16:41:49 **4** times, and I'm not going to take issue with your
16:41:51 **5** opinion in that regard.
16:41:52 **6** What I want to know is the phrase
16:41:56 **7** nonasbestos analog appears in ISO 13794. What does
16:42:00 **8** it mean? And if you have no idea, that's fine.
16:42:03 **9** MR. CIRSCH: Object to form.
16:42:04 **10** THE WITNESS: It's not that I don't have
16:42:05 **11** any idea. I have an opinion about it. And it's
16:42:08 **12** not my opinion that they're regulated asbestos
16:42:10 **13** or not and you count them. The protocol tells
16:42:13 **14** you to count them, that this is a regulated
16:42:16 **15** asbestos fiber, you will record it on a count
16:42:19 **16** sheet. All these protocols do that.
16:42:21 **17** It doesn't give you the information to
16:42:22 **18** make the determination. Just like it doesn't
16:42:24 **19** give you the information to determine if you
16:42:26 **20** have high tensile strength. It does not give
16:42:30 **21** you the information to make the determination
16:42:31 **22** what a population is. It does not give you the
16:42:34 **23** information to make a determination if it's
16:42:37 **24** flexible or not.
16:42:37 **25** **Q.** (By Mr. Chachkes) Putting aside what gets
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16:42:39 **1** counted and what doesn't get counted, what does
16:42:41 **2** nonasbestos analogs in this sentence mean? What does
16:42:45 **3** that phrase mean?
16:42:46 **4** MR. CIRSCH: Object to form. And this is
16:42:48 **5** the last time he's going to answer this
16:42:51 **6** question.
16:42:51 **7** THE WITNESS: I don't know what they're
16:42:52 **8** saying what it means because they don't give you
16:42:54 **9** any information to make that determination.
16:42:56 **10** I look at just simply what does
16:42:58 **11** asbestiform mean. It means formed like
16:43:01 **12** asbestos.
16:43:02 **13** So you may not like my opinion, but that's
16:43:06 **14** my opinion.
16:43:06 **15** **Q.** (By Mr. Chachkes) You know that under 2.6
16:43:13 **16** on page 2 it says, Asbestiform is a specific type of
16:43:17 **17** mineral fibrosity in which fibers and fibrils possess
16:43:21 **18** high tensile strength and flexibility.
16:43:24 **19** You see that; right?
16:43:25 **20** **A.** **What is it? 2.6?**
16:43:27 **21** **Q.** 2.6. Do you see that?
16:43:27 **22** **A.** **Yes, I do.**
16:43:27 **23** **Q.** Would it be reasonable to conclude
16:43:29 **24** nonasbestiform is something that is an analog to
16:43:33 **25** something that is asbestiform under 2.6?
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16:43:35 **1** **A.** **No.**
16:43:35 **2** MR. CIRSCH: Object to form.
16:43:36 **3** THE WITNESS: The protocol doesn't tell
16:43:38 **4** you what any of that means. High tensile
16:43:41 **5** strength. What tensile strength? How do you
16:43:45 **6** measure that?
16:43:46 **7** That's just a general geological
16:43:48 **8** definition for somebody who may be interested in
16:43:51 **9** digging asbestos out of the ground, and is it
16:43:53 **10** going to be fibrous enough to be profitable?
16:43:56 **11** That has no meaning in the protocol.
16:43:57 **12** Otherwise, in a protocol for how to do the
16:44:00 **13** analysis, how do you determine it's high tensile
16:44:03 **14** strength? What does high tensile strength mean?
16:44:06 **15** Is it 10,000 high, is it 2,000 high has no
16:44:11 **16** bearing on the actual analysis in the protocol.
17 **Q.** (By Mr. Chachkes) Okay.
16:44:13 **18** **A.** **This is nothing more than a standard**
16:44:16 **19** **geological definition for a high fibrous mine of**
16:44:20 **20** **asbestos.**
16:44:20 **21** **Q.** In your opinion, is the sentence that this
16:44:24 **22** method -- this ISO method can't discriminate between
16:44:28 **23** individual fibers of asbestos and nonasbestiform
16:44:31 **24** analogs, is it related to those definitions in 2.6,
16:44:35 **25** 2.7?
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16:44:36 **1 A. No, because those definitions aren't**
16:44:39 **2 defined anywhere in the protocol for the analysis.**
16:44:42 **3 Q. Okay. And so when ISO uses the word**
16:44:45 **4 asbestos on page 1, it's not related to how ISO**
16:44:49 **5 defines asbestos on page 2?**
16:44:52 **6 MR. CIRSCH: Object to form.**
16:44:53 **7 THE WITNESS: On page 2, if you go to**
16:45:02 **8 page 3, they define what a fiber is.**
16:45:08 **9 Is it page 3 or page 4? Give me a second.**
16:45:17 **10 ISO defines a fiber -- for the purpose of**
16:45:20 **11 this International Standard, a fiber is defined**
16:45:23 **12 to have an aspect ratio equal or greater than**
16:45:26 **13 5-to-1 and a minimum length of 5.0.**
16:45:29 **14 Fiber bundle, structure composed of**
16:45:31 **15 parallel smaller diameter fibers attached to**
16:45:35 **16 longer lengths.**
16:45:36 **17 Fibrous structure.**
16:45:38 **18 And then you go to, okay, once I've**
16:45:40 **19 defined it as a fiber, in the method tells you**
16:45:43 **20 to -- how to identify it if it is asbestos fiber**
16:45:46 **21 or not.**
16:45:48 **22 Nothing else in there tells you anything**
16:45:49 **23 about how to determine tensile strength, how to**
16:45:52 **24 determine flexibility, how to determine the**
16:45:56 **25 pop -- this one doesn't say population, but some**
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16:45:59 **1 do.**
16:45:59 **2 Q. (By Mr. Chachkes) It's a simple -- very**
16:46:01 **3 simple question. Page 1, the word asbestos is used.**
16:46:04 **4 On page 2 I see a definition of asbestos. Is it your**
16:46:07 **5 testimony that the two are unrelated, or are they**
16:46:10 **6 related?**
7 MR. CIRSCH: Object to form.
16:46:11 **8 Q. (By Mr. Chachkes) It's a yes or no. Are**
16:46:13 **9 they related?**
16:46:14 **10 MR. CIRSCH: Object to form.**
16:46:14 **11 THE WITNESS: This is not a yes and no**
16:46:16 **12 question. You have to take the whole protocol**
16:46:18 **13 into consideration to answer this question.**
16:46:21 **14 The whole protocol determines what is a**
16:46:24 **15 regulated asbestos, and then the asbestiform and**
16:46:27 **16 high tensile strength is just a general**
16:46:30 **17 definition. That's what it means.**
16:46:32 **18 Q. (By Mr. Chachkes) Okay. So if I want to**
16:46:36 **19 figure out what nonasbestos analog means in 1.1, I**
16:46:41 **20 could not use definitions like 2.6, 2.7, 2.8 to help**
16:46:46 **21 me determine that?**
16:46:48 **22 MR. CIRSCH: Object to form.**
16:46:49 **23 THE WITNESS: Well, those definitions tell**
16:46:51 **24 you what is a regulated asbestos fiber. There**
16:46:55 **25 is nothing in the protocol that tells you how to**
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16:46:58 **1 make the determination other than the counting**
16:47:00 **2 rules.**
16:47:01 **3 Certainly, if it doesn't have parallel**
16:47:04 **4 sides, if it is a piece of a chunk of rock,**
16:47:08 **5 yeah, that's nonasbestiform. But when it has**
16:47:10 **6 the definition and meets the regulatory fiber**
16:47:14 **7 definition for asbestos, it is asbestos.**
16:47:17 **8 Q. (By Mr. Chachkes) Okay. But you agree**
16:47:19 **9 with the sentence in -- all right. Strike that.**
16:47:36 **10 You personally can distinguish between**
16:47:40 **11 asbestos and nonasbestos analogs with TEM; is that**
16:47:44 **12 correct?**
16:47:44 **13 MR. CIRSCH: Object to form.**
16:47:45 **14 THE WITNESS: Yes, I can.**
16:47:49 **15 Q. (By Mr. Chachkes) Using the ISO 13794**
16:47:54 **16 method; correct?**
16:47:56 **17 A. Yes, I can. If it doesn't meet the**
16:47:57 **18 counting rules, it doesn't have parallel sides, it**
16:48:01 **19 doesn't have the aspect ratio, I don't record that as**
16:48:05 **20 an asbestos -- as an asbestos -- regulated asbestos**
16:48:09 **21 fiber.**
16:48:11 **22 Outside those counting rules, there's**
16:48:12 **23 nothing else in there. If it has parallel sides --**
16:48:18 **24 and what we're arguing is a small number of fibers.**
16:48:22 **25 I think in the MDL we had almost 90-something percent**
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16:48:25 **1 bundles.**
16:48:25 **2 So then we're dealing with some single**
16:48:29 **3 fibers. And because we have this -- and I'll call**
16:48:34 **4 it -- since a population is more than one, for these**
16:48:37 **5 two mine sources we're dealing with, we have a large**
16:48:40 **6 number of asbestiform bundles and a much smaller**
16:48:44 **7 number of individual fibers.**
16:48:45 **8 Q. Would you agree that there are two types**
16:48:47 **9 of tremolite --**
16:48:48 **10 MR. CIRSCH: Did you finish your answer,**
16:48:49 **11 Dr. Longo?**
16:48:49 **12 THE WITNESS: I think so.**
16:48:50 **13 Q. (By Mr. Chachkes) Would you agree that**
16:48:51 **14 there's two kinds of tremolite: asbestiform and**
16:48:54 **15 nonasbestiform?**
16:48:55 **16 A. I agree there's tremolite asbestos; and**
16:48:57 **17 then there's tremolite asbestos, regulated tremolite**
16:49:01 **18 asbestos. Then there is what we don't count as a**
16:49:04 **19 regulated asbestos fiber because of various reasons.**
16:49:07 **20 Q. Is there such a thing as nonasbestiform**
16:49:11 **21 tremolite?**
16:49:12 **22 A. There is cleavage fragment type small**
16:49:16 **23 particulates of tremolite that we do not count. You**
16:49:18 **24 can call it nonasbestiform; you can call it a**
16:49:20 **25 cleavage fragment. But I would agree with that.**
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16:49:23 **1 Anything below 5-to-1 aspect ratio we don't count.**

16:49:27 **2 And you can call it whatever you like, but it's not a**

16:49:30 **3 regulated asbestos fiber/bundle.**

16:49:32 **4 Q.** Okay. Do you ever -- do you feel like you

16:49:39 **5** have the ability to talk about a mineralogical --

16:49:42 **6** what you called a mineralogical definition of

16:49:44 **7** asbestos? Or is that outside of your expertise?

16:49:47 **8 A. You mean a geological definition?**

16:49:49 **9 Q.** Or a geological.

16:49:50 **10 A. Sure.**

16:49:50 **11 Q.** Okay. Geologically, what's a

16:49:52 **12** nonasbestiform asbestos?

16:49:53 **13 A. Rocks.**

16:49:56 **14 Q.** That's it? Everything that's rock is

16:49:59 **15** nonasbestiform asbestos?

16:50:01 **16** MR. CIRSCH: Object to form.

16:50:02 **17** THE WITNESS: If it doesn't have a fibrous

16:50:04 **18** habitat, it's nonasbestos.

16:50:07 **19 Q.** (By Mr. Chachkes) Okay.

16:50:08 **20 A. Or habit -- excuse me -- not habitat. I**

16:50:10 **21 think that's where animals live. I apologize.**

16:50:12 **22 Strike that.**

16:50:12 **23 If the crystalline habit is not fibrous,**

16:50:17 **24 then it's not something that is mined or used as a**

16:50:22 **25 regulated -- and it's not determined to be a**
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16:50:24 **1 regulated asbestos.**

16:50:24 **2 Q.** All right. You remember the original

16:50:26 **3** question was not about regulations; it was about the

16:50:28 **4** geological definitions; right?

16:50:31 **5** MR. CIRSCH: Object to form.

16:50:32 **6** THE WITNESS: I believe I have enough

16:50:33 **7** expertise to discuss the geological definitions,

16:50:36 **8** to discuss this high tensile strength, to

16:50:40 **9** discuss what the value of a mine is that has

16:50:42 **10** very matted, very fibrous asbestos, like

16:50:45 **11** chrysotile, versus what a ton of the same

16:50:49 **12** asbestos where it's 7M and it's almost two

16:50:54 **13** orders of magnitude difference. It's about the

16:50:56 **14** viability of a particular asbestos mine.

16:50:58 **15 Q.** (By Mr. Chachkes) Okay. Tremolite alone

16:51:02 **16** does not mean it's asbestos; would you agree with

16:51:04 **17** that statement --

16:51:09 **18** MS. O'DELL: Object to form.

19 Q. (By Mr. Chachkes) -- saying something's

20 tremolite?

21 MS. O'DELL: Object to form.

16:51:10 **22** THE WITNESS: It depends on what you're

16:51:11 **23** talking about. If you're talking about, say,

16:51:14 **24** XRD 20, 30, 40 years ago, said tremolite in a

16:51:20 **25** particular mine and over time that particular
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16:51:24 **1** mine has shown that the tremolite in there is

16:51:27 **2** primarily asbestiform, then, yeah, you can take

16:51:30 **3** all the data specifically and say, well, this

16:51:34 **4** whole data with XRD shows that there was

16:51:37 **5** tremolite present, but no, it doesn't -- XRD

16:51:39 **6** does not give you fibrous. But after a while,

16:51:43 **7** if you analyze enough samples out of the mine

16:51:45 **8** and you're seeing regulated asbestos fibers and

16:51:47 **9** bundles, then more likely than not those initial

16:51:51 **10** XRD analysis was asbestos.

16:51:53 **11 Q.** (By Mr. Chachkes) Without referring to

16:51:55 **12** the -- so you understand that I can look at a tree in

16:52:00 **13** many different ways. I can look at it through a

16:52:02 **14** microscope, I can look at it through a telescope, I

16:52:05 **15** can look at it with my own eyes. So far you're with

16:52:08 **16** me?

16:52:08 **17 A. So far.**

16:52:09 **18 Q.** Okay. Do you understand that the way I

16:52:10 **19** look at it doesn't change the definition of whether

16:52:12 **20** it's a tree or not; right?

16:52:14 **21** MR. CIRSCH: Object to form.

16:52:15 **22 Q.** (By Mr. Chachkes) Is that true or not?

16:52:16 **23** MR. CIRSCH: Object to form.

16:52:17 **24 Q.** (By Mr. Chachkes) I'm only asking about

16:52:20 **25** the tree now.
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16:52:21 **1 A. I don't think you would be able to tell by**

16:52:24 **2 a telescope. But if you're looking at a tree, it's a**

16:52:27 **3 tree.**

16:52:27 **4 Q.** Right. It doesn't matter how I'm looking

16:52:29 **5** at it. A tree is a tree; is that correct?

16:52:32 **6** MS. O'DELL: Object to form.

16:52:33 **7** THE WITNESS: Your tree analogy for a

16:52:36 **8** tree, that's correct.

16:52:36 **9 Q.** (By Mr. Chachkes) Okay. So are you

16:52:38 **10** saying it's different for asbestos? I call something

16:52:41 **11** asbestos or nonasbestiform depending on how I look at

16:52:44 **12** it?

16:52:44 **13** MR. CIRSCH: Object to form.

16:52:45 **14** THE WITNESS: No. It's sort of a

16:52:46 **15** misleading kind of analogy.

16:52:48 **16** What I'm talking about is back 50 years

16:52:53 **17** ago, when you're looking at a tree, you said it

16:52:56 **18** was a tree. Somebody asked later that -- people

16:52:59 **19** went in who actually knew what trees were and

16:53:02 **20** said, well, 95 percent of these are oak trees 40

16:53:05 **21** years later. Then you go, well, what was I

16:53:07 **22** actually looking at 50 years ago for these same

16:53:10 **23** trees? Well, oak trees.

16:53:11 **24 Q.** (By Mr. Chachkes) I'm just talking

16:53:13 **25** about -- okay. Stick with me here. Don't talk about
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16:53:16 **1** history. Don't talk about the way I'm looking at
16:53:18 **2** things. Don't talk about regulations.
16:53:20 **3** Just strictly objectively, what is
16:53:24 **4** nonasbestiform versus asbestiform?
16:53:27 **5** MR. CIRSCH: Object to form.
16:53:28 **6** **Q.** (By Mr. Chachkes) And if you can do that
16:53:30 **7** without telling me -- without -- can you do that
16:53:33 **8** without talking about the device I'm looking at it
16:53:34 **9** with? Is that possible?
16:53:37 **10** MR. CIRSCH: Object to form.
16:53:38 **11** THE WITNESS: No --
16:53:40 **12** **Q.** (By Mr. Chachkes) Okay. What --
16:53:43 **13** **A.** -- because --
16:53:43 **14** MR. CIRSCH: Let him answer.
16:53:43 **15** THE WITNESS: What we're doing here is
16:53:44 **16** we're using sophisticated devices to make the
16:53:49 **17** determination if these are regulated asbestos or
16:53:50 **18** not.
16:53:50 **19** I understand that maybe for whatever
16:53:52 **20** reason you want to just pick little pieces here
16:53:55 **21** and there, but this is not what we do with this
16:53:56 **22** analysis.
16:53:57 **23** We're using standard peer-reviewed
16:54:02 **24** published protocols for the determination of
16:54:05 **25** regulated asbestos fibers and bundles.
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16:54:08 **1** **Q.** (By Mr. Chachkes) Tremolite -- just
16:54:10 **2** saying something is tremolite does not mean it's
16:54:12 **3** asbestos in certain contexts; is that true?
16:54:15 **4** MS. O'DELL: Object to the form.
16:54:16 **5** THE WITNESS: Again, when we do these
16:54:18 **6** analyses, anything that doesn't meet the
16:54:20 **7** regulated asbestos counting rules we do not
16:54:23 **8** count. You can call it whatever you like, but
16:54:25 **9** it doesn't meet the counting rules.
16:54:27 **10** Everything that we have published and
16:54:29 **11** provided here is regulated asbestos fibers and
16:54:32 **12** bundles.
16:54:33 **13** **Q.** (By Mr. Chachkes) Okay. What is a
16:54:34 **14** cleavage fragment?
16:54:35 **15** **A.** Cleavage fragment, typically for
16:54:38 **16** tremolite, is particulates that have an aspect ratio
16:54:41 **17** of somewhere between 1-to-1 to 1-to-2, but they will
16:54:44 **18** have the same chemistry and the same crystalline
16:54:47 **19** pattern.
16:54:48 **20** **Q.** Do you agree with ISO 13794 when it
16:54:53 **21** defines cleavage fragment as a fragment of a crystal
16:54:57 **22** that is bounded by cleavage faces?
16:55:00 **23** **A.** Yes.
16:55:00 **24** **Q.** Would you agree with this statement:
16:55:03 **25** Crushing of nonasbestiform amphiboles can -- I'm
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16:55:09 **1** sorry. Strike that. Start again.
16:55:19 **2** Do you agree with this statement:
16:55:21 **3** Crushing of nonasbestiform amphibole can lead to
16:55:24 **4** elongate fragments that conform to the definition of
16:55:27 **5** a fiber?
16:55:30 **6** **A.** I've not seen those with these counting
16:55:35 **7** rules. Certainly we have seen lots of these
16:55:38 **8** fragments that are below 5-to-1 aspect ratio.
16:55:45 **9** I'm not ruling it out, but we typically
16:55:47 **10** don't see that. When we did a size distribution
16:55:51 **11** of --
16:55:52 **12** **Q.** I'm not talking about what you can't
16:55:54 **13** see --
16:55:55 **14** MR. CIRSCH: Hold on.
16:55:56 **15** THE WITNESS: Hold on, hold on.
16:55:57 **16** We don't typically see that but your
16:55:59 **17** hypothetical, if it does have parallel sides, if
16:56:02 **18** it does meet all the definitions of the counting
16:56:04 **19** rules, you can call it what you like, but it's
16:56:07 **20** regulated asbestos per the standard counting
16:56:10 **21** rules for every one of these TEM methods that I
16:56:13 **22** have referenced in my report.
16:56:15 **23** **Q.** (By Mr. Chachkes) I kind of lost track
16:56:17 **24** there.
16:56:17 **25** Do you agree with the statement: Crushing
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16:56:20 **1** of asbestiform amphibole can lead to elongate
16:56:23 **2** fragments that conform to the definition of a fiber?
16:56:26 **3** MR. CIRSCH: Object to form.
16:56:27 **4** THE WITNESS: I've not seen one, so maybe
16:56:29 **5** somebody else has.
16:56:30 **6** **Q.** (By Mr. Chachkes) Okay. Do you agree
16:56:32 **7** with the statement: Crushed nonasbestiform
16:56:34 **8** amphiboles rarely have aspect ratios exceeding
16:56:37 **9** 30-to-1?
16:56:38 **10** **A.** I've not seen crushed -- I'm sorry, would
16:56:42 **11** you repeat that?
16:56:43 **12** **Q.** Crushed nonasbestiform amphiboles rarely
16:56:46 **13** have aspect ratios exceeding 30-to-1.
16:56:49 **14** **A.** I've rarely seen anything greater than
16:56:53 **15** 1-to-1, 2-to-1, 3-to-1.
16:57:00 **16** **Q.** The question is do you agree with that
16:57:02 **17** statement, yes or no?
16:57:03 **18** **A.** That's too broad. I mean, I would say
16:57:06 **19** crushed particles of nonregulated asbestos fibers and
16:57:13 **20** bundles, the aspect ratio very rarely exceeds 3-to-1,
16:57:18 **21** 4-to-1.
16:57:19 **22** **Q.** Okay. ISO -- strike that.
16:57:24 **23** What is the average width of a tremolite
16:57:28 **24** fiber under the TEM?
16:57:31 **25** MR. CIRSCH: Object to form.
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16:57:31 **1** THE WITNESS: An individual fiber
16:57:32 **2** typically can run anywhere from about .2 to .4,
16:57:39 **3** seen some as high as .5 for an individual fiber.
16:57:42 **4** **Q.** (By Mr. Chachkes) Okay. Do you have a
16:57:44 **5** peer-reviewed reference to support that?
16:57:50 **6** MS. O'DELL: Your original question was
16:57:52 **7** what he had seen.
16:57:54 **8** MR. CHACHKES: Actually, no. The original
16:57:55 **9** question was what is the average width.
16:57:56 **10** THE WITNESS: I think if you look at Wylie
16:57:58 **11** and others, they say that single tremolite or
16:58:01 **12** single amphibole fibers very rarely exceed .5,
16:58:04 **13** .6. So there's a number of references out
16:58:07 **14** there. I can't remember all the citations, but
16:58:09 **15** there's a number of references on that.
16:58:11 **16** **Q.** (By Mr. Chachkes) The question is do you
16:58:12 **17** have a peer-reviewed reference to cite to to support
16:58:15 **18** your testimony that the average width of a tremolite
16:58:18 **19** fiber is usually between .2 and .4?
16:58:21 **20** MR. CIRSCH: Object to form.
16:58:22 **21** THE WITNESS: I've seen as high as .5.
16:58:25 **22** There's a range. And it's been published
16:58:28 **23** before, but no, I don't have the citation on me.
16:58:30 **24** **Q.** (By Mr. Chachkes) What's the average
16:58:31 **25** width of an anthophyllite fiber under TEM?
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16:58:37 **1** MR. CIRSCH: Object to form.
16:58:37 **2** THE WITNESS: Typically in the same range
16:58:40 **3** as tremolite.
16:58:41 **4** **Q.** (By Mr. Chachkes) And do you have a
16:58:44 **5** citation for a peer-reviewed paper to support that?
16:58:47 **6** **A.** **Not that I can rattle off the top of my**
16:58:51 **7** **head, no, sir.**
16:58:52 **8** **Q.** What's the largest width an anthophyllite
16:58:54 **9** particle can have and still be characterized as a
16:58:57 **10** fiber under TEM?
16:59:00 **11** MR. CIRSCH: Object to form.
16:59:01 **12** MS. O'DELL: Would you repeat that,
16:59:03 **13** please?
16:59:03 **14** **Q.** (By Mr. Chachkes) What is the largest
16:59:04 **15** width of an anthophyllite particle -- strike that.
16:59:08 **16** What is the largest width an anthophyllite
16:59:10 **17** particle can have and still be characterized as a
16:59:12 **18** fiber under TEM?
16:59:14 **19** **A.** **Whatever width that will exceed equal to**
16:59:22 **20** **5-to-1 aspect ratio. So it doesn't have a cutoff on**
16:59:26 **21** **the width for a single fiber. As long as it**
16:59:32 **22** **exceeds -- greater than or equal to 5 -- aspect ratio**
16:59:35 **23** **of 5.**
16:59:36 **24** **Q.** So the width doesn't matter; it's the
16:59:38 **25** aspect ratio that matters?
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16:59:40 **1** **A.** **Correct.**
16:59:40 **2** **Q.** Okay. Do you have a reference,
16:59:43 **3** peer-reviewed reference, to cite for that?
16:59:45 **4** **A.** **Every one of the counting protocols do not**
16:59:48 **5** **have a maximum on the width. They all have the same**
16:59:52 **6** **counting protocol for the aspect ratios for the**
16:59:56 **7** **length, for greater than .5 micrometers. So they're**
17:00:00 **8** **all the same.**
17:00:01 **9** **I'm not aware of any of these**
17:00:02 **10** **peer-reviewed publications, protocols, stating that**
17:00:08 **11** **there is a maximum width.**
17:00:11 **12** MR. CIRSCH: We've been going about an
17:00:12 **13** hour, so when you get to the next spot, can we
17:00:15 **14** take a break?
17:00:16 **15** MR. CHACHKES: Sure. Give me maybe like 5
17:00:17 **16** more minutes; is that okay?
17:00:18 **17** MR. CIRSCH: It's up to the doctor.
17:00:18 **18** THE WITNESS: I would like to take a break
17:00:20 **19** now.
17:00:20 **20** **Q.** (By Mr. Chachkes) Okay. Can I just
17:00:22 **21** ask -- let me ask one more --
17:00:24 **22** **A.** **Okay.**
17:00:24 **23** **Q.** -- because it's just basically the same
17:00:25 **24** one, tremolite.
17:00:26 **25** What is the largest width a tremolite
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17:00:28 **1** particle can have and still be characterized as a
17:00:30 **2** fiber under TEM? Is it same answer?
17:00:32 **3** **A.** **It's the same answer. Now, we don't see**
17:00:34 **4** **any single fibers with widths that exceed or that are**
17:00:39 **5** **any width. I mean, it's in that range that I've**
17:00:42 **6** **talked about.**
17:00:43 **7** **Typically, when it gets larger, it is a**
17:00:45 **8** **bundle, and you can have -- we've had bundles as wide**
17:00:49 **9** **as 1 to 2 micrometers in diameter, but that's made up**
17:00:53 **10** **of -- something that big is made up tens to hundreds**
17:00:57 **11** **of individual fibers.**
17:00:57 **12** **Q.** But hypothetically, you see a tremolite
17:00:58 **13** particle with a width of 1, you would still
17:01:01 **14** characterize that as a fiber if the aspect ratio was
17:01:06 **15** in the right range?
17:01:08 **16** MR. CIRSCH: Object to form.
17:01:09 **17** THE WITNESS: Hypothetically, because I
17:01:11 **18** don't believe we've ever seen one in any of
17:01:13 **19** these protocol -- any of these analyses. But if
17:01:14 **20** it has -- if it meets the peer-reviewed counting
17:01:18 **21** rules for regulated asbestos, yes, it would be
17:01:21 **22** counted, hypothetically.
17:01:23 **23** MR. CHACHKES: Okay. Let's take a break.
17:01:25 **24** (Recess from 5:01 p.m. to 5:20 p.m.)
17:21:00 **25** **Q.** (By Mr. Chachkes) Going back to
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17:21:07 **1** Exhibit 21, which is ISO 13794, now, 2.7, that's a
17:21:16 **2** definition of asbestos; correct?
17:21:20 **3** **A. 2.7?**
17:21:21 **4** **Q.** Yes. On page 2.
17:21:23 **5** **A. Oh.**
17:21:42 **6** **Q.** Is that a definition of asbestos?
17:21:45 **7** **A. That's their definition, yes, sir.**
17:21:47 **8** **Q.** Okay. Now, I've heard you use the phrase,
17:21:50 **9** the distinction, geological and regulatory
17:21:54 **10** definitions as if they were different. Which one is
17:21:57 **11** this?
17:21:58 **12** **A. It's just a general definition.**
17:22:04 **13** **Q.** Okay. It's not a geological definition,
17:22:07 **14** it's not a regulatory definition, it's just a
17:22:09 **15** definition?
17:22:10 **16** **A. Let's see. Crystallized in asbestiform**
17:22:14 **17** **habit. That's for both. Long, thin, flexible,**
17:22:18 **18** **strong fibers when crushed or processed. They don't**
17:22:20 **19** **define what strong is, but that's just a general**
17:22:23 **20** **definition.**
17:22:23 **21** **Q.** Okay. Is it your opinion that there's no
17:22:28 **22** such thing as a cleavage fragment for something that
17:22:31 **23** has a greater than 5-to-1 aspect ratio?
17:22:33 **24** **A. I never said that.**
17:22:34 **25** **Q.** Okay. Is there such a thing as a cleavage
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17:22:40 **1** fragment for something that has a greater than 5-to-1
17:22:41 **2** aspect ratio?
17:22:41 **3** **A. With parallel sides we've not seen one,**
17:22:44 **4** **but I guess hypothetically it's possible.**
17:22:46 **5** **Q.** Okay. Is there anything in the published
17:22:55 **6** literature that you've seen that suggests that there
17:22:58 **7** are cleavage fragments with a greater than 5-to-1
17:23:02 **8** aspect ratio?
17:23:02 **9** **A. There's been a number of published**
17:23:05 **10** **articles that state things like that, yes.**
17:23:08 **11** **Q.** Are there any published articles that
17:23:11 **12** state that there are cleavage fragments that have
17:23:13 **13** greater than 3-to-1 aspect ratio?
17:23:15 **14** **A. Yes, there is publications that state**
17:23:19 **15** **that.**
17:23:19 **16** **Q.** Okay. If I pulled a hand-sized amphibole
17:23:27 **17** rock out that had a greater than 5-to-1 aspect ratio,
17:23:32 **18** would you call that a fiber?
17:23:34 **19** MR. CIRSCH: Object to form.
17:23:34 **20** THE WITNESS: If it is a rock and doesn't
17:23:36 **21** have any parallel sides that define a fiber, no.
17:23:40 **22** **Q.** (By Mr. Chachkes) Does MAS have a
17:23:42 **23** protocol in place for describing the dimensions of
17:23:44 **24** fibers under the visual inspection under TEM?
17:23:47 **25** **A. Yes.**
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17:23:48 **1** **Q.** Is it written down?
17:23:51 **2** **A. Yes.**
17:23:51 **3** **Q.** Have you produced it?
17:23:53 **4** **A. No.**
17:23:54 **5** MR. CHACHKES: Okay. We'd like that
17:23:56 **6** produced.
17:23:56 **7** MS. O'DELL: We'll consider it.
17:23:57 **8** **Q.** (By Mr. Chachkes) Okay. Does MAS have a
17:23:58 **9** protocol in place for describing the dimensions of
17:24:01 **10** fibers -- sorry.
17:24:10 **11** What do you call that protocol? Is there
17:24:12 **12** a name for it?
17:24:13 **13** **A. Well, the protocol is the method we have**
17:24:16 **14** **here. It tells you how to make those measurements.**
17:24:18 **15** **It has -- the microscopes have calibrated concentric**
17:24:24 **16** **circles that allow you to make the measurements for**
17:24:28 **17** **greater than .5 micrometers. It is -- parallel sides**
17:24:33 **18** **is a visual determination.**
17:24:37 **19** MR. CHACHKES: Let's look at that. Let's
17:24:39 **20** look at some TEM photomicrographs. Can we mark
17:24:43 **21** this Exhibit 22? Can we just put the sticker
17:24:52 **22** here so it doesn't obstruct anything?
17:24:54 **23** (Defendants' Exhibit 22 was marked for
17:25:15 **24** identification.)
17:25:15 **25** **Q.** (By Mr. Chachkes) All right. Look at
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17:25:16 **1** Exhibit 22. Can you tell me what -- that very top
17:25:22 **2** row of three, is that asbestiform fibers, if you knew
17:25:28 **3** you were looking at an amphibole?
17:25:30 **4** **A. Top row, this one?**
17:25:32 **5** **Q.** Yeah.
17:25:34 **6** **A. Just looking at the photograph, I would**
17:25:38 **7** **state that that is a regulated asbestos size --**
17:25:41 **8** **asbestiform or not for these different photographs.**
17:25:41 **9** **Q.** All right.
17:25:48 **10** **A. Certainly one, I would say two. I'd have**
17:25:52 **11** **to be looking at that under a TEM to make that**
17:25:55 **12** **determination if it's asbestiform or not. It**
17:25:57 **13** **certainly has the aspect ratio; it has parallel**
17:26:01 **14** **sides. That would be a regulated asbestos, at least**
17:26:02 **15** **in TEM. It's unclear. This may be -- this may be**
17:26:10 **16** **optical microscopy.**
17:26:13 **17** **Q.** That third one on the very top row, what
17:26:17 **18** could you see under TEM or do under TEM that would
17:26:20 **19** make you say, oh, that's not regulated asbestos,
17:26:25 **20** assuming it's an amphibole?
17:26:26 **21** **A. Well I would have to be looking at it**
17:26:28 **22** **under the TEM so -- you're looking at an optical**
17:26:32 **23** **microscopy picture.**
17:26:33 **24** **Q.** But what is it you would be -- what is it
17:26:36 **25** that you could see under a TEM that would make you
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17:26:38 **1** think that's not -- because the aspect ratio
17:26:40 **2** obviously is greater than 5-to-1; right?
17:26:41 **3 A. Well, I would take a look at it and see**
17:26:43 **4 parallel sides, is that multiple fibers. I don't**
17:26:48 **5 know what magnification this is at.**
17:26:50 **6 So again, I would prefer to be looking at**
17:26:51 **7 something under a TEM than just play**
17:26:54 **8 guess-what-this-is.**
17:26:54 **9 Q. Okay. So it's possible what you're**
17:26:56 **10 looking at there which has an aspect ratio of -- it's**
17:27:00 **11 greater than 5-to-1; right?**
17:27:01 **12 A. That's correct.**
17:27:02 **13 Q. Okay. It's possible that that's not --**
17:27:04 **14 that's nonasbestiform if it doesn't have parallel**
17:27:08 **15 sides; is that true?**
17:27:09 **16 A. Again, this is an optical microscopy**
17:27:11 **17 picture. So unless I was looking at this under the**
17:27:14 **18 TEM, but certainly has parallel sides. I don't know**
17:27:17 **19 the width. I can't really make out the micron bar, I**
17:27:21 **20 don't know the magnification.**
17:27:22 **21 So you'll have to get some other expert to**
17:27:25 **22 take a look at it, if he's willing to opine what that**
17:27:29 **23 is versus the counting rules in the TEM.**
17:27:32 **24 Q. In the second row, assuming that**
17:27:36 **25 everything in the second row is amphibole, would you**
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17:27:40 **1** call those asbestiform or not?
17:27:44 **2 A. Again, I'm looking at an optical**
17:27:51 **3 microscopy picture. We've got a bundle that -- I**
17:27:58 **4 mean, I can't look at the micron bar. Possibly just**
17:28:01 **5 the one in the middle because you can see individual**
17:28:03 **6 fibrils.**
17:28:04 **7 Q. Okay. If you saw that under your TEM,**
17:28:07 **8 would you label that as asbestos?**
17:28:08 **9 A. Well, I'm not looking at it under TEM. So**
17:28:13 **10 if it's under an optical microscopy method and it**
17:28:16 **11 meets the definition, it's got parallel sides, it**
17:28:20 **12 looks like it has multiple fibers in the bundle, that**
17:28:23 **13 by definition is asbestiform.**
17:28:25 **14 Q. And why do you say it looks like it has**
17:28:28 **15 multiple fibers in the bundle?**
17:28:29 **16 A. Because I can see them.**
17:28:30 **17 Q. Okay. You're referring to the lines that**
17:28:34 **18 go from the northwest towards the southeast starting**
17:28:36 **19 in the top?**
17:28:37 **20 A. Yes, sir.**
17:28:37 **21 Q. Okay. In the third row, assuming those**
17:28:40 **22 are amphiboles, do you have enough information to**
17:28:44 **23 determine whether they're asbestiform?**
17:28:46 **24 A. I can't really see what we have here under**
17:28:50 **25 these. And I'm assuming the fourth and five row --**
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17:28:56 **1 Q. Well, let's not get ahead of ourselves.**
17:29:00 **2 Now, in the third row, do you have enough**
17:29:04 **3 information from these pictures to see whether**
17:29:07 **4 they're bundles or fibers?**
17:29:09 **5 A. No. It's too out of focus.**
17:29:12 **6 Q. Okay.**
17:29:12 **7 A. I would -- looks like you have dark field**
17:29:15 **8 here. I would have to see this in the TEM.**
17:29:17 **9 Q. Okay. In the second row, far left, do you**
17:29:21 **10 have enough -- does it appear to you whether there**
17:29:24 **11 are bundles or fibers?**
17:29:25 **12 A. No, you can't make out. Most of these are**
17:29:27 **13 just particles. And I would have to be looking at**
17:29:31 **14 this one that has parallel sides. But I would have**
17:29:36 **15 to be determining if I could see individual fibers in**
17:29:38 **16 it or not.**
17:29:39 **17 Q. In the fourth row, second from the bottom,**
17:29:46 **18 are these asbestiform?**
17:29:48 **19 A. Maybe.**
17:29:50 **20 Q. What additional information would you need**
17:29:53 **21 to determine that?**
17:29:53 **22 A. I need to be looking at it in the TEM**
17:29:58 **23 or -- so that I can make a determination. The size,**
17:30:02 **24 the magnification.**
17:30:08 **25 Q. Do you have enough information in the**
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17:30:10 **1** second -- in that second-to-last row, those three
17:30:13 **2 pictures, to determine whether that's asbestiform?**
17:30:15 **3 A. I wouldn't make that call either way**
17:30:19 **4 unless I could be looking at it under the TEM. It**
17:30:22 **5 looks like very little magnification. And I**
17:30:25 **6 apologize, but they're fairly poor photographs.**
17:30:28 **7 Q. Okay. In the last row, same question. In**
17:30:31 **8 those three pictures at the very bottom of**
17:30:34 **9 Exhibit 22, are those -- see the single fibers -- the**
17:30:37 **10 single item in the middle, would you call that**
17:30:40 **11 asbestiform?**
17:30:41 **12 A. It has parallel sides. I can't see**
17:30:48 **13 individual fibers. But I would call that a regulated**
17:30:52 **14 asbestos fiber or bundle, maybe.**
17:30:55 **15 Again, I would need to be looking at the**
17:30:57 **16 TEM analysis of these or at least better photographs.**
17:31:01 **17 Q. Okay. So the bottom six are all TEM**
17:31:08 **18 photomicrographs from you? You realize that; right?**
17:31:12 **19 MR. CIRSCH: Object to form.**
17:31:13 **20 THE WITNESS: And that's fine. If you**
17:31:14 **21 tell me which ones they are, at least I can get**
17:31:17 **22 better images.**
17:31:17 **23 Q. (By Mr. Chachkes) These are the images**
17:31:20 **24 you provided to us; right?**
17:31:22 **25 A. Well, when we provide the book, we provide**
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17:31:25 **1 a large photograph that has better resolution,**
17:31:30 **2 et cetera.**
17:31:33 **3 Q.** Okay. Yeah, let's go look at -- let's
17:31:35 **4** look in the book, the upper left. So from the
17:31:38 **5** bottom -- what?
17:31:44 **6** MS. TROVATO: I'll let you know which one
17:31:45 **7** I have marked.
17:31:47 **8** MR. CHACHKES: Okay. I'm going to grab
17:31:48 **9** one for you from the book. Just tear it out.
17:31:54 **10** Okay. Let's mark it as Exhibit 23.
17:31:59 **11** (Defendants' Exhibit 23 was marked for
12 identification.)
17:32:21 **13** (Off the record.)
17:32:21 **14 Q.** (By Mr. Chachkes) Okay. So around
17:32:23 **15** page 985. Okay. So this one corresponds to second-
17:32:28 **16** to-the-last row, far right; correct?
17:32:34 **17 A. Yes.**
17:32:34 **18 Q.** Okay. Are you looking at something that's
17:32:36 **19** asbestiform there?
17:32:37 **20 A. I'm looking at a regulated asbestos**
17:32:43 **21 structure. We have talc underneath it. But I would**
17:32:46 **22 see individual fibers -- you know, I'm not on the**
17:32:51 **23 TEM. This is only 1/2 micrometer in width, but it**
17:32:54 **24 looks like we have individual fibers in here. So**
17:32:56 **25 yes.**
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17:32:56 **1 Q.** Okay. Is this -- so for those of us who
17:33:03 **2** are trying to determine whether you made the right
17:33:05 **3** call, is this photomicrograph enough to determine the
17:33:08 **4** morphology of what we're looking at?
17:33:13 **5 A. Yes.**
17:33:14 **6 Q.** Okay. In your old reports, the reports
17:33:33 **7** that were the non-MDL samples, would you agree that
17:33:36 **8** you characterized the majority of the particles
17:33:38 **9** identified as fibrous, not bundles?
17:33:41 **10** MR. CIRSCH: Object to form.
17:33:42 **11** THE WITNESS: I don't think I ever counted
17:33:45 **12** them up.
17:33:45 **13 Q.** (By Mr. Chachkes) Okay. In your MDL --
17:33:50 **14** but the majority, the large majority is fiber, not
17:33:53 **15** bundles in the old MDL reports?
17:33:56 **16** MS. O'DELL: Object to form.
17:33:56 **17** THE WITNESS: I'm not sure I agree with
17:33:58 **18** that.
17:33:58 **19 Q.** (By Mr. Chachkes) I'm sorry, the old
17:33:59 **20** non-MDL reports.
17:34:00 **21 A. I'd have to look at them to see if I agree**
17:34:03 **22 with that or not.**
17:34:03 **23 Q.** Okay. In your new -- the MDL reports,
17:34:07 **24** about 96 percent of the particles your analysts
17:34:11 **25** identify are bundles; correct?
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17:34:12 **1 A. Correct.**
17:34:12 **2 Q.** If there's a stark difference between the
17:34:18 **3** ratio of fibers to bundle found as compared between
17:34:21 **4** the MDL sample analysis and the non-MDL sample
17:34:25 **5** analysis, what would explain that?
17:34:26 **6** MR. CIRSCH: Object to form.
17:34:27 **7** THE WITNESS: That there was more bundles
17:34:29 **8** than fibers.
17:34:30 **9 Q.** (By Mr. Chachkes) Aren't they supposed to
17:34:31 **10** be the same thing, representative sample of J&J talc?
17:34:35 **11** MR. CIRSCH: Object to form.
17:34:35 **12** THE WITNESS: Not necessarily.
17:34:36 **13 Q.** (By Mr. Chachkes) Why not?
17:34:37 **14 A. It's just a matter of where -- the area in**
17:34:40 **15 the mine and what was dug out, if that was correct,**
17:34:42 **16 then we should say that all J&J talc has these**
17:34:46 **17 concentrations of asbestos. So that doesn't bother**
17:34:50 **18 me.**
17:34:50 **19 Q.** You think it might be random chance that
17:34:55 **20** the same mine samples in your old reports you report
17:35:00 **21** majority of fibers, and in your new reports you
17:35:04 **22** report as almost exclusively bundles?
17:35:06 **23** MR. CIRSCH: Object to form.
17:35:08 **24** THE WITNESS: We just call them as we see
17:35:09 **25** them.
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17:35:10 **1 Q.** (By Mr. Chachkes) But is it random
17:35:11 **2** chance? That's what I'm asking.
17:35:12 **3 A. I don't know if it's random chance or not.**
17:35:16 **4 These are what we distinguish as fibers and bundles.**
17:35:20 **5 Q.** Okay. One would expect a random sample of
17:35:23 **6** bottles from a Vermont mine over time to have the
17:35:27 **7** same ratio whether you are looking last year or this
17:35:30 **8** year; right?
17:35:31 **9** MR. CIRSCH: Object to form.
17:35:32 **10** THE WITNESS: I'm only aware of in the old
17:35:36 **11** samples that there was two that could be said
17:35:39 **12** came from Vermont. So we're looking at a much
17:35:42 **13** bigger population of Vermont samples than we
17:35:45 **14** were of the originals. And one of those was a
17:35:50 **15** MDL sample. So you're comparing apples and
17:35:54 **16** oranges.
17:35:55 **17 Q.** (By Mr. Chachkes) What about the Italian?
17:35:56 **18 A. The Italian, I'd have to look at it and**
17:36:01 **19 count them up because there wasn't that many fibers**
17:36:04 **20 as compared to the others, so we have a bigger pool**
17:36:06 **21 of fibers and bundles.**
17:36:07 **22 Q.** If you did the entire set of MDL samples
17:36:10 **23** over again, would you expect to find the same ratio
17:36:13 **24** of bundles to fibers?
17:36:17 **25** MR. CIRSCH: Object to form.
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17:36:17 **1** THE WITNESS: I don't have any expectation
17:36:19 **2** of what we're going to find or what we expect.
17:36:21 **3** We just count using the protocols and make the
17:36:25 **4** decision on what morphology it is.
17:36:27 **5** **Q.** (By Mr. Chachkes) Okay. Have you
17:36:28 **6** testified that the modified Blount TEM method you
17:36:31 **7** employed in your March 2018 report is materially
17:36:35 **8** identical to the ISO 22262?
17:36:37 **9** **A.** **I don't think I -- it's not identical.**
17:36:43 **10** **The old Blount report uses a different heavy density**
17:36:47 **11** **liquid separation. But the ISO, we can use the same**
17:36:52 **12** **spin rate, same time for rpm and spin rate.**
17:36:59 **13** **But the difference is the -- even the old**
17:37:03 **14** **Blount is the same. And that's -- what's interesting**
17:37:06 **15** **about the ISO 22262-2, it gives you the leeway to use**
17:37:11 **16** **whatever you need to use. And the only thing it**
17:37:16 **17** **really specifies is the density of the heavy liquid.**
17:37:21 **18** **Q.** You used the Blount TEM method in your
17:37:23 **19** March 2018 report; correct?
17:37:24 **20** **A.** **Correct.**
17:37:24 **21** **Q.** Was it materially identical to what's
17:37:28 **22** mandated in ISO 22262?
17:37:32 **23** **A.** **ISO 22262 doesn't mandate any particular**
17:37:35 **24** **conditions. So you can use whatever procedures you**
17:37:41 **25** **feel work the best. And that's because the spin**
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17:37:45 **1** **rates and rpm does not really affect the overall**
17:37:48 **2** **concentrations, and it happened to be the same**
17:37:51 **3** **density, liquid density.**
17:37:53 **4** **Q.** You've testified that the same four
17:37:56 **5** associates at MAS have conducted all of MAS's
17:37:58 **6** analysis of Johnson's Baby Powder in your reports
17:38:01 **7** going all the way back to 2017; is that correct?
17:38:03 **8** **MR. CIRSCH:** Object to form.
17:38:04 **9** **THE WITNESS:** We have some of the same
17:38:08 **10** people, yes.
17:38:09 **11** **Q.** (By Mr. Chachkes) Okay. What about are
17:38:11 **12** they the same? Is it the same people who were
17:38:13 **13** doing -- analyzing Johnson Baby Powder in early 2017
17:38:19 **14** as are doing it now?
17:38:22 **15** **A.** **You'll have to clarify that question.**
17:38:25 **16** **Q.** Well, there were four people doing
17:38:28 **17** analysis in the MDL report; right?
17:38:30 **18** **A.** **Correct.**
17:38:30 **19** **Q.** There are four people doing analysis in
17:38:33 **20** the reports that rely on research all the way back
17:38:39 **21** to -- analysis all the way back to 2017; correct?
17:38:42 **22** **A.** **I'd have to look at that.**
17:38:43 **23** **Q.** Okay. I'm asking is it the same four
17:38:46 **24** people? You don't know?
17:38:48 **25** **MR. CIRSCH:** Object to the form.
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17:38:49 **1** THE WITNESS: I'd have to look and see who
17:38:50 **2** the four people are because there are some folks
17:38:53 **3** who started doing, you know, analysis now may
17:38:57 **4** not have been doing analysis then, and there's
17:38:59 **5** some folks doing analysis then that are not
17:39:02 **6** doing analysis now. It's just easy to look in
17:39:05 **7** the count sheets and see if they're the same or
17:39:08 **8** not.
17:39:08 **9** **Q.** (By Mr. Chachkes) Is there additional
17:39:12 **10** data concerning the samples upon which you reported
17:39:15 **11** for TEM that is in a file somewhere in your
17:39:20 **12** laboratory but not printed out and not produced?
17:39:22 **13** **A.** **All the data for these particular samples**
17:39:25 **14** **are here.**
17:39:25 **15** **Q.** Okay. Was there any data generated in
17:39:28 **16** connection with the TEM analysis in this case that
17:39:30 **17** was thrown away or deleted?
17:39:32 **18** **A.** **No, not that I'm aware of.**
17:39:34 **19** **Q.** You personally have not conducted any of
17:39:37 **20** the PLM testing included in your MDL report; correct?
17:39:40 **21** **A.** **That is correct.**
17:39:40 **22** **Q.** Did you sit with your analysts as they did
17:39:42 **23** the PLM testing?
17:39:45 **24** **A.** **I have probably looked in that optical**
17:39:47 **25** **microscope 50 times in the last two months.**
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17:39:50 **1** **Q.** So when you say you've looked in it,
17:39:52 **2** you've looked in it while your analysts were testing
17:39:58 **3** MDL samples for the purposes of your current report?
17:40:00 **4** **A.** **Well, you can't -- both of you can't look**
17:40:02 **5** **in the microscope at the same time. A lot of times**
17:40:05 **6** **it's on the monitor that we use so that we can**
17:40:09 **7** **increase the sensitivity. But, no, I don't**
17:40:12 **8** **personally do the PLM analysis.**
17:40:14 **9** **Q.** Yeah, but I'm trying to get the sense of
17:40:16 **10** were you actively involved looking through the
17:40:20 **11** microscope or looking along with the other person
17:40:23 **12** into the microscope for the PLM that's reported on in
17:40:25 **13** the MDL?
17:40:27 **14** **A.** **I have been active with the PLM**
17:40:29 **15** **microscopists looking at structures, looking at**
17:40:34 **16** **different aspects of it, but ultimately he makes the**
17:40:38 **17** **decision.**
17:40:38 **18** **Q.** Okay. So the decisions -- the opinions in
17:40:43 **19** your report about whether the PLM was a positive for
17:40:46 **20** asbestos, those are the opinions of your analysts?
17:40:50 **21** **A.** **It's not an opinion.**
17:40:51 **22** **MS. O'DELL:** Form.
17:40:52 **23** **THE WITNESS:** It meets the definition. It
17:40:54 **24** has the right crystalline information. It meets
17:40:58 **25** all the different definitions. To me, that is
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17:41:00 **1** not an opinion.
17:41:01 **2 Q.** (By Mr. Chachkes) Okay. Those are the
17:41:03 **3** conclusions of your analysts?
17:41:05 **4 A.** Yes.
17:41:06 **5 Q.** Okay. You have personally never tested a
17:41:08 **6** talc sample for asbestos from start to finish
17:41:10 **7** yourself?
17:41:11 **8 A.** That is correct.
17:41:11 **9 Q.** You're not trained in using PLM for the
17:41:14 **10** purposes of testing talc for asbestos?
17:41:17 **11** MR. CIRSCH: Object to form.
17:41:18 **12** THE WITNESS: I have not taken a PLM
17:41:20 **13** course for asbestos.
17:41:20 **14 Q.** (By Mr. Chachkes) You've not published
17:41:25 **15** any PLM methodologies?
17:41:27 **16 A.** No, sir. We're not using our
17:41:29 **17** methodologies. We're using the standard protocol
17:41:33 **18** methodologies. So if we were to publish -- when we
17:41:36 **19** publish this, we would be publishing that this is the
17:41:39 **20** method we used. That's like everybody else.
17:41:42 **21 Q.** Have you published any PLM work testing
17:41:44 **22** for asbestos in any context?
17:41:47 **23 A.** Yes.
17:41:51 **24 Q.** What is it?
17:41:52 **25 A.** Our gasket study, our vermiculite studies,
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17:41:59 **1** our -- that have been published. A number of papers
17:42:03 **2** are published where it's going to be a study on
17:42:05 **3** exposure. You usually have to determine what the
17:42:08 **4** concentration of asbestos is in the materials before
17:42:11 **5** you publish that.
17:42:12 **6 Q.** Those are published in peer-reviewed
17:42:14 **7** literature?
17:42:14 **8 A.** Yes, sir.
17:42:15 **9 Q.** Okay. But those are not finding asbestos
17:42:17 **10** in talc; right?
17:42:21 **11 A.** No, sir. These are all construction
17:42:25 **12** products.
17:42:26 **13 Q.** Are you an expert in PLM?
17:42:30 **14 A.** I think I know more than the average
17:42:32 **15** layperson.
17:42:32 **16 Q.** Are you an expert in PLM?
17:42:36 **17** MR. CIRSCH: Object to form.
17:42:37 **18** THE WITNESS: Again, that's up to a judge
17:42:38 **19** to be an expert.
17:42:39 **20** I know how the analysis is done, I could
17:42:42 **21** do an analysis if I -- it would take me a lot
17:42:46 **22** longer than what people typically do.
17:42:47 **23 Q.** (By Mr. Chachkes) One of the
17:42:48 **24** disadvantages of PLM that you cite is that it cannot
17:42:51 **25** resolve particles less than 1/2 micrometer; is that
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17:42:56 **1** correct?
17:42:56 **2 A.** Individual fibers, unless they have a
17:42:58 **3** number of fibers in a bundle. But we don't see
17:43:00 **4** individual fibers. In fact, we haven't seen any
17:43:04 **5** individual fiber in any of these analyses that we've
17:43:07 **6** done. They've all been very large bundles.
17:43:09 **7 Q.** Is it unambiguously true that asbestos
17:43:19 **8** particles must be at least 1/2 micrometer in the
17:43:21 **9** smallest dimension to be visible under PLM?
17:43:23 **10 A.** That's what's stated. We never see
17:43:25 **11** individual fibers of any size. Everything that we
17:43:30 **12** have run across is these very large bundles that have
17:43:33 **13** multiple fibers in them.
17:43:35 **14 Q.** But I'm talking about not what you're
17:43:37 **15** actually seeing, but this is a matter of the
17:43:41 **16** resolution.
17:43:42 **17** Must asbestos particles be at least 1/2
17:43:44 **18** micrometer in the smallest dimension to be visible
17:43:49 **19** under PLM?
17:43:49 **20 A.** It may be visible, but it's hard to go
17:43:53 **21** through the dispersion staining and everything
17:43:55 **22** associated to make a positive identification.
17:43:57 **23** So maybe theoretically that's possible,
17:44:01 **24** but it's not something that's routinely seen, that I
17:44:04 **25** know of.
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17:44:04 **1 Q.** Do you have the ability to detect asbestos
17:44:08 **2** fibers with a width of approximately .3 micrometers
17:44:13 **3** by PLM?
17:44:15 **4 A.** Again, it may be theoretically possible,
17:44:19 **5** but I'm not aware that it's routinely done. We've
17:44:23 **6** never seen any in the cosmetic talc.
17:44:25 **7 Q.** Shouldn't the particle distribution be on
17:44:33 **8** a bell curve so that you would expect that some
17:44:37 **9** exist?
17:44:37 **10** MR. CIRSCH: Object to form.
17:44:38 **11** THE WITNESS: I'm sure there is -- it is
17:44:41 **12** in there because a lot of these we have positive
17:44:43 **13** TEMs. But these two techniques have different
17:44:47 **14** size distributions that they can see or they can
17:44:49 **15** resolve or not resolve to be able to absolutely
17:44:52 **16** determine if it is regulated asbestos or not.
17:44:56 **17 Q.** (By Mr. Chachkes) Is it your position
17:45:01 **18** that particles below 1/2 micrometer are not
17:45:04 **19** resolvable because your analysts have never observed
17:45:08 **20** particles of that width or smaller?
17:45:09 **21 A.** It's my position that these are fibers,
17:45:12 **22** and single fibers are not being resolved in this
17:45:15 **23** matrix or seen by the PLM.
17:45:20 **24 Q.** Is that because your analysts haven't
17:45:22 **25** observed it, or is it just because of the nature of
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17:45:24 **1** the devices? Do you have some higher level
17:45:27 **2** understanding of the nature of the devices?
17:45:29 **3** MR. CIRSCH: Object to form.
17:45:30 **4** **Q.** (By Mr. Chachkes) It is empirical or is
17:45:32 **5** it something different?
17:45:32 **6** MR. CIRSCH: Object to form.
17:45:33 **7** THE WITNESS: I don't know if it's
17:45:36 **8** empirical or not.
17:45:37 **9** I mean, we haven't answered all the
17:45:40 **10** questions about the PLM analysis of cosmetic
17:45:43 **11** talc. But we do know that to do a PLM analysis
17:45:48 **12** properly, you have to spend the time necessary.
17:45:51 **13** You have to look at the sample in dispersion
17:45:56 **14** staining. You need a high definition camera as
17:45:58 **15** well as a monitor so that you can resolve and
17:46:02 **16** get the focal plane necessary to see individual
17:46:04 **17** fibers.
17:46:06 **18** But we haven't run across individual
17:46:08 **19** fibers. I know every protocol says, well, you
17:46:10 **20** can see down to .5, you can see down to .3.
17:46:14 **21** There's one thing about seeing them. There's
17:46:16 **22** another thing going through the process of being
17:46:18 **23** able to see the colors in the dispersion
17:46:21 **24** staining, the extinction angle.
17:46:24 **25** I just don't know if that's really
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17:46:26 **1** possible because this type of matrix that we're
17:46:30 **2** looking at is so different than what PLM
17:46:32 **3** analysts are typically dealing with.
17:46:35 **4** **Q.** (By Mr. Chachkes) Did MAS test any talcum
17:46:41 **5** powder samples with the ISO 22262 method prior to the
17:46:44 **6** analysis included in your reports in this case?
17:46:47 **7** MR. CIRSCH: Object to form.
17:46:48 **8** THE WITNESS: No. I mean, we may have --
17:46:51 **9** you know, we're slowly trying to work through
17:46:54 **10** the old non-MDLs so that we can compare apples
17:46:58 **11** to oranges. But when we get done with that,
17:47:03 **12** we'll issue another report.
17:47:03 **13** **Q.** (By Mr. Chachkes) Have you analyzed the
17:47:05 **14** old talcum powder samples under ISO 22262 recently?
17:47:12 **15** **A. I don't know. I haven't been focused in**
17:47:15 **16 on that. There may be some done.**
17:47:17 **17** **Q.** Is it possible -- strike that.
17:47:22 **18** ISO 22262 method is promulgated by the
17:47:28 **19** International Organization for Standardization; is
17:47:28 **20** that correct?
17:47:29 **21** **A. Yes, sir.**
17:47:29 **22** **Q.** Are you currently a member of any of the
17:47:32 **23** ISO national standards bodies?
17:47:33 **24** **A. I am not.**
17:47:34 **25** **Q.** Did you vote on any of the ISO standards?
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17:47:37 **1** **A. I did not.**
17:47:39 **2** **Q.** Did you participate in the drafting of any
17:47:42 **3** ISO standards?
17:47:43 **4** **A. I did not.**
17:47:44 **5** **Q.** Have you spoken with any of the authors of
17:47:46 **6** any of the ISO standards that we talked about today?
17:47:50 **7** **A. Not in some time, but not specifically**
17:47:53 **8 about the 22262-1 and 2.**
17:47:55 **9** **Q.** What about 3?
17:47:57 **10** **A. No, sir, I haven't spoken to anybody about**
17:48:00 **11 3 -- any of the authors of 3.**
17:48:01 **12** **Q.** Which of the three parts of the ISO 22262
17:48:06 **13** did your analysts employ in the analysis of the ISO
17:48:11 **14** PLM portion of your report?
17:48:15 **15** MR. CIRSCH: Object to form.
17:48:16 **16** THE WITNESS: All the counting rules, all
17:48:18 **17** the -- what's defined as asbestiform, what's the
17:48:22 **18** 20-to-1. Everything that's used in there.
17:48:26 **19** **Q.** (By Mr. Chachkes) So you're saying it
17:48:28 **20** didn't matter, it's the same in all of 1 -- part 1,
17:48:31 **21** part 2, and part 3?
17:48:32 **22** **A. Well, I misunderstood the question.**
17:48:34 **23** **Q.** Yeah, let me ask it again a little better.
17:48:36 **24** Which of part 1, part 2, or part 3 did
17:48:41 **25** your analysts use when they analyzed the MDL samples
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17:48:48 **1** under PLM?
17:48:49 **2** **A. Part 1.**
17:48:49 **3** **Q.** Do you know when those methods in part 1
17:48:53 **4** were promulgated?
17:48:55 **5** **A. Looks like 2012/07/01.**
17:49:06 **6** **Q.** What do you mean by 2012/07/01?
17:49:12 **7** **A. I'm just looking at when it says it was**
17:49:14 **8 issued. ISO -- so it has 2012, first edition, and I**
17:49:22 **9 don't know if they're using 07 as the day and 01 as**
17:49:26 **10 the month or the other way around.**
17:49:27 **11** **Q.** So part 1 was promulgated in 2012?
17:49:31 **12** **A. Yes, sir.**
17:49:31 **13** **Q.** Okay. Are you aware of any other talc
17:49:34 **14** testing methods published in the scientific
17:49:36 **15** literature from 1991 to 2014 that include a
17:49:41 **16** concentration method?
17:49:43 **17** **A. Let's see. When was --**
17:49:46 **18** **Q.** You should use yours.
17:49:49 **19** **A. I'm just looking at the date.**
17:49:51 **20** **This one was 2014.**
17:49:53 **21** **Q.** You say this one's part 2; correct?
17:49:55 **22** **A. Part 2.**
17:49:55 **23** **Q.** Yeah. So I'm saying between 1991 and
17:49:58 **24** 2014, are you aware of any testing -- talc testing
17:50:01 **25** methods in the published scientific literature that
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17:50:03 1 include a concentration method?
17:50:16 2 A. The 1989 and 1990 papers published by
17:50:19 3 Blount. She's analyzing talc. She's using the
17:50:23 4 concentration method.
17:50:25 5 Q. Are you aware of any other?
17:50:27 6 A. That specifically say talc, no.
17:50:30 7 Q. Are you aware of any other talc testing
17:50:33 8 methods published in the scientific literature prior
17:50:36 9 to 1991 that include a concentration method?
17:50:39 10 A. Not in the published literature, no.
17:50:44 11 Q. One strength of PLM is that it can provide
17:50:48 12 a qualitative estimate of the weight percentage of
17:50:52 13 asbestos; true?
17:50:53 14 A. That is a strength, yes.
17:50:55 15 Q. What does the word qualitative mean in
17:50:58 16 that answer?
17:50:59 17 A. That it's an estimate based on
17:51:01 18 petrographic standards for how much material is --
17:51:09 19 that you're estimating on.
17:51:11 20 Q. Your analysts conducted a visual
17:51:14 21 estimation of the concentration of asbestos fibers in
17:51:16 22 the talc samples?
17:51:17 23 A. Asbestos bundles, yes, sir.
17:51:19 24 Q. Okay. Your report also references
17:51:25 25 generated weight percentage standards; correct?
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17:51:29 1 A. Yes.
17:51:29 2 Q. How were your lab's weight percentage
17:51:33 3 standards generated?
17:51:35 4 A. You mean the spike samples?
17:51:37 5 Q. Yes.
17:51:37 6 A. Taking that one JBP, I think it's number
17:51:51 7 13, and then you mix the appropriate materials
17:51:53 8 together so that you get a weight percent -- a
17:51:58 9 weighted percent, where you put -- say,
17:52:02 10 hypothetically, you know, 5 grams of tremolite and
17:52:05 11 then you then dilute the sample with additional talc
17:52:08 12 to make it .1 or .2 or .3. Standard method.
17:52:13 13 Q. Okay. Did you produce those generated
17:52:16 14 calculations?
17:52:17 15 A. No.
17:52:18 16 Q. Okay. We request that you produce those.
17:52:20 17 In your report you write that for positive
17:52:25 18 samples a visual estimation of the quantity of
17:52:28 19 asbestos observed was based on eye calibration
17:52:32 20 through review of lab-generated weight percentage
17:52:36 21 standards.
17:52:36 22 Does that ring a bell?
17:52:38 23 A. Yes.
17:52:38 24 Q. What is eye calibration?
17:52:39 25 A. It's a petrographic term for when you're
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17:52:41 1 looking at the area that is covered by the asbestos
17:52:45 2 versus the area that you're looking at. So there's
17:52:48 3 calibrated petrographic materials to help optical
17:52:54 4 microscopists to make these qualitative estimates.
17:52:58 5 Q. How often do you update your lab's weight
17:53:02 6 percentage standards?
17:53:03 7 A. I think we updated them the last time we
17:53:08 8 sent stuff to Lee Poye.
17:53:10 9 Q. And what regularity -- with what
17:53:14 10 regularity do you update those?
17:53:17 11 A. We don't have a regulatory. We make new
17:53:19 12 standards and send them off; and if we need
17:53:22 13 additional standards, we make them again.
17:53:24 14 Q. Who generated those standards?
17:53:25 15 A. Victoria Panariello.
17:53:28 16 Q. Okay. Did you monitor her when she did
17:53:31 17 that?
17:53:32 18 A. Did I sit here and -- stand there and
17:53:34 19 watch her? No.
17:53:35 20 Q. Did you monitor her in any other way?
17:53:37 21 A. No.
17:53:37 22 Q. Are you aware your method includes a
17:53:41 23 qualification that visual estimations of asbestos
17:53:43 24 concentrations pursuant to this method have been
17:53:46 25 demonstrated to consistently yield an overestimate of
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17:53:49 1 the proportion of asbestos?
17:53:53 2 MS. O'DELL: Object to the form.
17:53:54 3 THE WITNESS: I'm sorry, where is this
17:53:55 4 stated?
17:53:56 5 Q. (By Mr. Chachkes) In one of the ISO
17:53:57 6 documents that you're referring to, does it say that
17:54:00 7 this method that we're talking about consistently
17:54:04 8 yields an overestimate of the proportion of asbestos?
17:54:08 9 Are you aware of that?
17:54:09 10 A. I don't recall that.
17:54:10 11 Q. Okay. Do you believe that this
17:54:16 12 methodology we're talking about consistently yields
17:54:18 13 an overestimate of the proportion of asbestos?
17:54:20 14 A. No.
17:54:20 15 Q. Did your analyst use a point counting
17:54:45 16 method?
17:54:46 17 A. No.
17:54:46 18 Q. ISO 22262-2 includes a method for point
17:54:51 19 counting by PLM; correct?
17:54:53 20 A. It does.
17:54:54 21 Q. So instead of following the point counting
17:55:01 22 method in ISO 22262-2, you used an estimation based
17:55:07 23 on eyeball?
17:55:10 24 MR. CIRSCH: Form.
17:55:11 25 THE WITNESS: Estimation-based typical PLM
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17:55:12 **1** analysis, that's also in the 22262-1. They give
17:55:16 **2** you both, the ability to do either one.
17:55:19 **3 Q.** (By Mr. Chachkes) I'm talking about
17:55:21 **4** 22262-2, is there the eyeballing method in 22262-2?
17:55:27 **5** MR. CIRSCH: Object to form.
17:55:27 **6** THE WITNESS: We only do the section 16,
17:55:30 **7** section 14 in the counting rules for TEM in the
17:55:35 **8** ISO 22262-2.
17:55:37 **9 Q.** (By Mr. Chachkes) So is it your opinion
17:55:38 **10** that the ISO 22262-2 point counting method is not
17:55:44 **11** required; it's just merely optional?
17:55:48 **12 A.** **22262, if you are going to do PLM, it goes**
17:55:52 **13 back to the 1, and it provides you the ability to do**
17:55:55 **14 either/or.**
17:55:56 **15 Q.** Okay. So it's your opinion that point
17:55:59 **16** counting in 22262-2 is optional?
17:56:03 **17** MR. CIRSCH: Object to form.
17:56:03 **18** THE WITNESS: You're going to have to show
17:56:05 **19** me where the point counting is in 22262-2.
17:56:09 **20 Q.** (By Mr. Chachkes) Okay. Sitting here
17:56:10 **21** today, rather than burning the time on that, do you
17:56:16 **22** have any reason to believe it's not optional, that it
17:56:18 **23** was required, you just didn't do it?
17:56:20 **24** MS. O'DELL: Object to the form.
17:56:21 **25** THE WITNESS: No, I don't believe that.
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17:56:23 **1 Q.** (By Mr. Chachkes) Okay. Do you have any
17:56:23 **2** reason to believe it's optional and so you had the
17:56:28 **3** option of not going it?
17:56:29 **4** MS. O'DELL: Object to form.
17:56:30 **5** MR. CIRSCH: Object to form.
17:56:30 **6** THE WITNESS: We follow the 22262-1 PLM
17:56:34 **7** method. It provides the ability to do both
17:56:37 **8** types of estimation. And point counting is
17:56:41 **9** another type of estimation.
17:56:43 **10 Q.** (By Mr. Chachkes) For those particles
17:56:44 **11** that you determined were asbestiform in your report,
17:56:48 **12** for each one, is it your opinion that these are
17:56:51 **13** minerals with a fibrosity in which the fibers and
17:56:57 **14** fibrils possess a high tensile strength and
17:57:00 **15** flexibility?
17:57:01 **16** MR. CIRSCH: Object to form.
17:57:01 **17** MS. O'DELL: Would you repeat that,
17:57:02 **18** please?
17:57:03 **19** MR. CHACHKES: Can you read that back?
17:57:24 **20** (The record was read by the reporter.)
17:57:24 **21** MR. CIRSCH: Object to form.
17:57:25 **22** THE WITNESS: Again -- I guess we could
17:57:27 **23** rehash this -- that is a general definition.
17:57:29 **24** The protocol does not provide you any
17:57:31 **25** methodology to determine high tensile strength
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17:57:35 **1** or any tensile strength.
17:57:38 **2** It does not define what high is. It does
17:57:40 **3** not define how you determine flexibility on a
17:57:43 **4** microscopic scale.
17:57:45 **5** I guess that is just an opinion of
17:57:48 **6** somebody taking a look at it. But it's not
17:57:51 **7** required for this analysis.
17:57:53 **8 Q.** (By Mr. Chachkes) I'm not asking a
17:57:55 **9** question at all about what's required. I'm asking
17:57:57 **10** about what your opinion is. Do the fibers you
17:58:02 **11** identified as asbestiform in your report possess high
17:58:06 **12** tensile strength and flexibility?
17:58:08 **13** MR. CIRSCH: Object to form.
17:58:09 **14 Q.** (By Mr. Chachkes) Did you determine that?
17:58:10 **15 A.** **You can't determine it. The protocol**
17:58:12 **16 doesn't tell you how to determine it. It doesn't**
17:58:14 **17 provide any guidance on how to determine it. It**
17:58:16 **18 doesn't tell you what, quote, high tensile strength**
17:58:20 **19 is.**
17:58:21 **20 High tensile strength to me, personally,**
17:58:21 **21 probably 100 psi. I don't think that's what they**
17:58:25 **22 mean, but at least there should be some guidance of**
17:58:28 **23 some sort to say, okay, somehow you have to put an**
17:58:30 **24 Instron inside your optical microscope and grab a**
17:58:35 **25 microscopic bundle and put it in the Instron and then**
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17:58:37 **1 measure the tensile strength, and it has to be over**
17:58:41 **2 5,000 psi. None of that exists.**
17:58:43 **3 A methodology is supposed to -- for a**
17:58:46 **4 person using a methodology is step A, step B, step C,**
17:58:51 **5 step D. There is no methodology for determining**
17:58:55 **6 tensile strength, much less an undefined high tensile**
17:58:58 **7 strength.**
17:58:59 **8 Q.** Is there anything in the published
17:59:00 **9** literature that allows a scientist to determine the
17:59:03 **10** tensile strength and flexibility of a putative
17:59:07 **11** asbestos fiber?
17:59:07 **12 A.** **Not individual fibers, no. There's plenty**
17:59:10 **13 of literature that geologists walking around in a**
17:59:15 **14 mine can make a grab sample, usually 10 to**
17:59:18 **15 15 centimeters long, they'll tape it to paper, it's**
17:59:21 **16 very flexible at that, and then they'll put it in an**
17:59:24 **17 Instron and pull it, and then they can determine the**
17:59:27 **18 tensile strength.**
17:59:28 **19 Q.** Have you ever heard of -- sorry.
17:59:28 **20 A.** **Go ahead. I'm sorry.**
17:59:30 **21 Q.** Did you ever hear of a PLM scientist
17:59:33 **22** looking at a sample and pushing it down and if it
17:59:36 **23** breaks versus whether it bends, that relates to
17:59:40 **24** tensile strength? Have you ever heard of that?
17:59:41 **25** MR. CIRSCH: Object to form.
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17:59:42 **1** THE WITNESS: No. There's no protocol for
17:59:45 **2** that.
17:59:45 **3** MR. CIRSCH: Alex, we probably should
17:59:47 **4** break any time in the next few minutes, if we
17:59:50 **5** can.
6 MR. CHACHKES: Yeah, we can take a break,
18:01:21 **7** that's fine.
18:01:21 **8** (Recess from 6:01 p.m. to 6:53 p.m.)
19:15:25 **9** **Q.** (By Mr. Chachkes) Dr. Longo, your
19:15:52 **10** analysts reported identifying cleavage fragments in
19:15:56 **11** many of the samples by ISO PLM; correct?
19:15:58 **12** **A.** **Yes.**
19:15:58 **13** **Q.** How many anthophyllite cleavage fragments
19:16:01 **14** did your analysts detect?
19:16:03 **15** **A.** **I don't recall them detecting any.**
19:16:04 **16** **Q.** How many tremolite cleavage fragments did
19:16:08 **17** your analysts detect?
19:16:08 **18** **A.** **We just determined -- we didn't do a count**
19:16:11 **19** **of how many cleavage fragments, only that they were**
19:16:13 **20** **present.**
19:16:14 **21** **Q.** Did you produce the data regarding the
19:16:16 **22** cleavage fragment particles in these samples?
19:16:20 **23** **A.** **I produced all the data we have. Some of**
19:16:22 **24** **the photographs you can see some of the cleavage**
19:16:26 **25** **fragments, others you can't.**
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19:16:27 **1** **Q.** Did you quantify identified cleavage
19:16:32 **2** fragments the way you quantified identified
19:16:35 **3** asbestiform fibers and bundles?
19:16:36 **4** **A.** **No.**
19:16:37 **5** **Q.** And you don't report on cleavage fragments
19:16:41 **6** in your report; correct? I'm sorry, strike that.
19:16:45 **7** You don't report on the concentration of
19:16:47 **8** cleavage fragments in your report; correct?
19:16:49 **9** **A.** **I do not.**
19:16:50 **10** **Q.** Okay. And you did not take that data?
19:16:54 **11** **A.** **Other than to note that they were present.**
19:16:57 **12** **Q.** Okay. And you cannot state to a
19:17:00 **13** reasonable degree of scientific certainty what the
19:17:02 **14** concentration of cleavage fragments in any of these
19:17:04 **15** samples were; correct?
19:17:05 **16** **A.** **We did not quantify the numbers of**
19:17:09 **17** **cleavage fragments that were observed other than that**
19:17:12 **18** **they were present.**
19:17:13 **19** MR. CHACHKES: Okay. Let's look at this
19:17:15 **20** one.
19:17:19 **21** All right. We're going to look at a
19:17:21 **22** sample where the analyst reported both cleavage
19:17:24 **23** fragments and asbestos by PLM. Let's mark 24.
24 (Defendants' Exhibit 24 was marked for
19:17:43 **25** identification.)
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19:17:43 **1** **Q.** (By Mr. Chachkes) So you see at the
19:17:44 **2** bottom, this is a -- actually, what do you call this
19:17:50 **3** count sheet here, this sheet, Exhibit 24?
19:17:53 **4** **A.** **It's the PLM analysis bench sheet.**
19:17:56 **5** **Q.** Okay. So this Exhibit 24, which is your
19:17:58 **6** PLM analysis bench sheet for a particular sample, you
19:18:01 **7** see at the bottom that both cleavage fragments and
19:18:07 **8** asbestos particles were observed?
19:18:09 **9** **A.** **Yes.**
19:18:10 **10** **Q.** Okay. I see it says -- is it both
19:18:15 **11** actinolite and tremolite cleavage fragments were
19:18:18 **12** observed? Am I reading that right?
19:18:19 **13** **A.** **Yes.**
19:18:19 **14** **Q.** And let's go to -- and this is from your
19:18:24 **15** report, pages 120 to 128 from your January report,
19:18:28 **16** the analysis for bottle M68503-010-BL1; do you see
19:18:37 **17** that?
19:18:37 **18** **A.** **Yes.**
19:18:38 **19** **Q.** Okay. So let's turn to the picture -- the
19:18:47 **20** first picture we get to, which is I guess on page 2
19:18:50 **21** of this document.
19:18:51 **22** Which are cleavage fragments and which are
19:18:53 **23** asbestiform, or can you not tell?
19:18:56 **24** **A.** **Well the one that we see here that's**
19:18:58 **25** **measured as 69 micrometers, that is asbestiform. We**
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19:19:03 **1** **have many talc particles, and --**
19:19:06 **2** **Q.** How do you know which are the talc
19:19:10 **3** particles?
19:19:10 **4** **A.** **I'm looking at them. Because under**
19:19:13 **5** **dispersion staining they're usually anywhere from --**
19:19:17 **6** **depending on the thickness of bluish to a brighter**
19:19:20 **7** **yellow.**
19:19:21 **8** **And potentially, one other asbestiform**
19:19:28 **9** **down in the lower left-hand -- next to a fairly good**
19:19:35 **10** **size talc particle.**
19:19:36 **11** **Q.** It looks like the top of a T --
19:19:36 **12** **A.** **Yes --**
19:19:37 **13** **Q.** -- on its side?
19:19:39 **14** **A.** **-- that's a good description.**
19:19:41 **15** **And as for cleavage fragments -- and I**
19:19:44 **16** **would have to be looking in the microscope, but I**
19:19:46 **17** **would say potentially one.**
19:19:49 **18** **Q.** Where?
19:19:49 **19** **A.** **There (indicating).**
19:19:53 **20** **Q.** So you're pointing to it looks like a
19:19:56 **21** yellow kernel of corn somewhere center left, and
19:19:59 **22** there's a very small kind of orangish stain right to
19:20:03 **23** the right of it; is that what you're looking at?
19:20:05 **24** **A.** **That's what I'm saying, potentially one.**
19:20:08 **25** **Q.** Okay. What about the next page? Do you
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19:20:14 **1** see any asbestiform particles, any cleavage
19:20:17 **2** fragments?
19:20:18 **3 A. Well, we're looking at the exact same**
19:20:25 **4 material. Now we're in perpendicular dispersion,**
19:20:29 **5 which you have this color change, so there's no new**
19:20:33 **6 information here.**
19:20:35 **7 Q. Okay. And so what you identified in the**
19:20:37 **8 previous page as a potential cleavage fragment, is**
19:20:40 **9 that what I see, it's kind of like center, down about**
19:20:43 **10 halfway, above what looks like a yellow delta.**
19:20:53 **11 A. Yes.**
19:20:57 **12 Q. Okay. Looking at the purple page. Tell**
19:21:15 **13 me when you're there. There's something an arrow is**
19:21:18 **14 pointing at. What's that?**
19:21:19 **15 A. That's the same structure we've been**
19:21:22 **16 looking at. It's at a higher magnification, 200**
19:21:25 **17 times.**
19:21:25 **18 Q. Okay.**
19:21:25 **19 A. So that's the actinolite/tremolite**
19:21:30 **20 asbestos bundle, and the resolution on the elongation**
19:21:35 **21 with the gypsum filter, if it's 530 nanometers,**
19:21:42 **22 you're not resolving any of these very small**
19:21:45 **23 particulates.**
19:21:45 **24 Q. So you called it a bundle. Where are the**
19:21:47 **25 fibers?**
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19:21:48 **1 A. Well, you can't see it there, but you can**
19:21:51 **2 see the fibers in the dispersion staining on both the**
19:22:03 **3 perpendicular and the parallel orientations.**
19:22:06 **4 Q. Those are the first two pages we looked**
19:22:09 **5 at?**
19:22:09 **6 A. Yes.**
19:22:09 **7 Q. Okay. Explain how you selected the**
19:22:17 **8 refractive index liquid when you conducted -- when**
19:22:21 **9 you're conducting analysis.**
19:22:23 **10 A. The 1.605 is a common refractive indices**
19:22:27 **11 liquid that you can use. You can use 1.605, you can**
19:22:31 **12 use a 1.63 or a 1.64; but that's, in my opinion, the**
19:22:38 **13 most common refractive indices liquid for amphiboles.**
19:22:43 **14 Q. When you call it the most common, is**
19:22:46 **15 that -- can I find that in the peer-reviewed**
19:22:48 **16 literature?**
19:22:48 **17 A. Let's see. Would it say the most common?**
19:22:58 **18 I don't know. But -- you know, I won't waste time,**
19:23:02 **19 but in the one they'll talk about the different**
19:23:09 **20 refractive indices liquids. You can use others.**
19:23:11 **21 Q. And you're looking at Exhibit 4, which is**
19:23:12 **22 the 22262 part 1?**
19:23:14 **23 A. Yes.**
19:23:14 **24 Q. I'm looking at page 15 where it says,**
19:23:31 **25 under 7.1.4.1, RI liquids in the range of 1.605 to**
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19:23:39 **1 1.660 are required at intervals of 0005.**
19:23:43 **2 Do you see that?**
19:23:45 **3 A. Yes.**
19:23:50 **4 Q. Okay. Is it what's in 7.1.4.1 that led**
19:23:57 **5 you to 1.605 as the RI liquid?**
19:24:01 **6 A. Yes and no. Yes, it states that 1.605.**
19:24:07 **7 But, no, it's the common refractive indices liquid**
19:24:11 **8 that we use that's in the R-93, so it's one of the**
19:24:14 **9 common refractive indices liquids for this type of**
19:24:17 **10 analysis.**
19:24:18 **11 Q. Okay. Did you use liquids at intervals of**
19:24:23 **12 005?**
19:24:24 **13 A. No. We just use 1.605.**
19:24:32 **14 Q. Can RI liquid 1.605 determine whether a**
19:24:38 **15 particle is anthophyllite?**
19:24:39 **16 A. Yes.**
19:24:40 **17 Q. Can it be used to determine whether a**
19:24:43 **18 particle is talc?**
19:24:44 **19 A. Yes. You can determine the difference**
19:24:49 **20 between the talc and the anthophyllite and the**
19:24:53 **21 tremolite in 1.605.**
19:24:55 **22 You can use 1.55 if you want further**
19:24:59 **23 identification.**
19:25:00 **24 Q. What color would anthophyllite appear as**
19:25:03 **25 using the RI liquid 1.605?**
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19:25:06 **1 A. Under dispersion staining it's typically a**
19:25:10 **2 lightish gold versus a darker, yellowish gold on the**
19:25:17 **3 tremolite, as I recall correctly.**
19:25:19 **4 Q. What about talc, what color does that show**
19:25:22 **5 up?**
19:25:22 **6 A. Anywhere from very bright, like as can be**
19:25:30 **7 seen in this, to, depending on the thickness, to a**
19:25:34 **8 bluish kind of grayish color.**
19:25:37 **9 Q. Okay. If the talc folds up on itself,**
19:25:40 **10 will it appear as a different color, that part that's**
19:25:43 **11 folded up on itself?**
19:25:44 **12 A. We've never seen that, but I don't believe**
19:25:46 **13 so, no.**
19:25:47 **14 Q. Okay. Does the peer-reviewed literature**
19:25:53 **15 tell you what the colors will be for RI 1.605 for**
19:25:57 **16 anthophyllite talc and tremolite?**
19:25:58 **17 A. Yes. Depending on what type of microscope**
19:26:04 **18 you have, if it's got an angular condenser lens and**
19:26:09 **19 what the temperature is, you can go through the**
19:26:11 **20 wavelengths of light and colors and pick out the**
19:26:15 **21 refractive indices for these particular types of**
19:26:18 **22 amphiboles.**
19:26:18 **23 Q. Okay. Would you expect sometimes using RI**
19:26:30 **24 liquid 1.605 for anthophyllite to turn up as a color**
19:26:32 **25 that's completely different from lightish gold?**
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19:26:35 **1** **A.** Sometimes that happens, depending on the
19:26:39 **2** thickness of the bundle, because of the way it's
19:26:43 **3** transmitted through the light, so then you have to
19:26:46 **4** look more around the edges of the bundle to get the
19:26:48 **5** appropriate colors.
19:26:49 **6** But I've seen it go from everything from a
19:26:51 **7** goldish yellow to a reddish to a blue when you get
19:26:54 **8** these really thick, multifiber bundles.
19:26:57 **9** **Q.** And where can I find in the peer-reviewed
19:27:01 **10** literature this range of colors and what they
19:27:03 **11** correspond to under RI 1.605?
19:27:06 **12** **A.** The Su article. Or any article that tells
19:27:12 **13** you how to do polarized light microscopy. You can go
19:27:16 **14** back to the early McCrone particle analysis.
19:27:31 **15** MR. CHACHKES: Okay. Let's mark as the
19:27:32 **16** next Exhibit 25.
19:27:33 **17** (Defendants' Exhibit 25 was marked for
19:27:59 **18** identification.)
19:27:59 **19** **Q.** (By Mr. Chachkes) Okay. In your expert
19:28:03 **20** opinion, is -- this is a talc particle and an
19:28:06 **21** anthophyllite particle?
19:28:08 **22** **A.** Well, you have one -- two talc particles
19:28:11 **23** that you can see for sure. This is out of focus.
19:28:15 **24** And then you have the anthophyllite asbestos bundle.
19:28:20 **25** **Q.** So the -- I'm focusing on the talc
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19:28:25 **1** particle in the center. It's your opinion that what
19:28:28 **2** happened is there's an anthophyllite fiber that has
19:28:32 **3** the exact length and is perfectly flush with the talc
19:28:37 **4** particle that happened to match perfectly that edge?
19:28:41 **5** MR. CIRSCH: Object to form.
19:28:42 **6** THE WITNESS: Yes.
19:28:48 **7** **Q.** (By Mr. Chachkes) Okay. And is there a
19:28:49 **8** chance that that actually is just the rolled up edge
19:28:51 **9** of a talc?
19:28:52 **10** **A.** No.
19:28:52 **11** **Q.** And why do you say no?
19:28:53 **12** **A.** Because you have some rolling here a
19:28:56 **13** little bit. But it doesn't matter if it rolls up;
19:29:00 **14** you're not going to get the same color like that.
19:29:02 **15** **Q.** And you said that you can get a range of
19:29:10 **16** colors for anthophyllite, including red and blue.
19:29:13 **17** Does the same apply for talc?
19:29:15 **18** **A.** No, that's not what I said. I said if you
19:29:18 **19** have a very thick bundle, you're going to have the
19:29:20 **20** range of colors. And it happens with the
19:29:22 **21** actinolite/tremolite also, but you do get the primary
19:29:25 **22** colors. Once it gets to a certain thickness,
19:29:29 **23** transmitting through the light is different. So we
19:29:33 **24** have some examples of those somewhere where you can
19:29:35 **25** get the appropriate colors. That's not rolled up
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19:29:37 **1** talc.
19:29:38 **2** **Q.** Okay. And do you have a reference in
19:29:44 **3** mind, peer-reviewed reference, that shows you what a
19:29:47 **4** rolled up talc looks like in a PLM?
19:29:49 **5** **A.** I've never seen a peer-reviewed reference
19:29:53 **6** that shows what that looks like. You know, I'll
19:29:56 **7** quote from Walter McCrone himself that he's never
19:30:01 **8** seen a rolled up talc particle.
19:30:03 **9** **Q.** And you're citing what paper?
19:30:05 **10** **A.** It's in my report, the reference to it,
19:30:09 **11** where he says exactly that he had -- for whatever
19:30:12 **12** reason, that I have never seen a rolled up talc
19:30:15 **13** particle.
19:30:16 **14** **Q.** Do you know what refractive index liquid
19:30:20 **15** it takes to make the distinction between
19:30:22 **16** anthophyllite and talc?
19:30:24 **17** **A.** You can use -- this is in 1.605.
19:30:30 **18** **Q.** Okay. Go ahead.
19:30:32 **19** **A.** You can use that. But if you're going to
19:30:35 **20** look just at the talc alone, you use the 1.5 fiber
19:30:40 **21** refractive indices liquid.
19:30:43 **22** **Q.** Okay.
19:30:43 **23** **A.** But you can't kind of mix and match here.
19:30:47 **24** If you're going to -- and we do that sometimes when
19:30:48 **25** there's no -- if there's no asbestiform bundles in
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19:30:52 **1** it, you'll see in some of our count sheets in there
19:30:56 **2** that it will have 1.55.
19:30:57 **3** **Q.** But it is your opinion that you can use
19:31:00 **4** 1.605 to distinguish anthophyllite and talc?
19:31:04 **5** **A.** Correct.
19:31:05 **6** **Q.** Okay. Is there additional data concerning
19:31:22 **7** the samples upon which you reported ISO PLM, as in a
19:31:26 **8** file somewhere in your laboratory but not printed out
19:31:28 **9** or produced?
19:31:29 **10** **A.** I don't believe so. I tried to produce
19:31:31 **11** everything that we took.
19:31:32 **12** **Q.** Okay. Was there any data generated in
19:31:34 **13** connection with ISO PLM analysis in this case that
19:31:36 **14** was either thrown away or deleted?
19:31:39 **15** **A.** No.
19:31:39 **16** **Q.** What are the differences, if any, between
19:31:45 **17** how your analysts employed the Blount method and how
19:31:50 **18** it is actually written in the 1991 article?
19:31:54 **19** **A.** The only difference is it's unable to
19:31:59 **20** really interpret how she counts the particulates or
19:32:03 **21** if she is counting the fibers per milligram of
19:32:06 **22** material. We've looked at that.
19:32:09 **23** So she gives it in numbers of fibers or
19:32:12 **24** numbers of bundles per milligram, a number count,
19:32:15 **25** which is the same thing we do, of course, in the TEM,
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19:32:19 **1** where we just follow the procedure here for the ISO
19:32:21 **2** 22262-1 for an estimated weight percent.
19:32:26 **3** **Q.** Okay. But otherwise, you followed the
19:32:28 **4** 1991 Blount method to the letter?
19:32:31 **5** **A.** Pretty much.
19:32:32 **6** **Q.** Following the Blount concentration, your
19:32:37 **7** analysts conducted PLM pursuant to ISO 22262-1 PLM
19:32:41 **8** method; right?
19:32:43 **9** **A.** That's correct.
19:32:43 **10** **Q.** Blount did not use that 22262-1 PLM;
19:32:49 **11** correct?
19:32:53 **12** **A.** No, she used a fiber count method so that
19:32:57 **13** if you look at her data, I think she has anywhere for
19:33:02 **14** that sample I, which is the Johnson & Johnson Vermont
19:33:05 **15** sample, 1989-1990, she finds in the range of about
19:33:11 **16** 100 to almost 235 milligrams -- fiber/bundles per
19:33:14 **17** milligram. So if you multiply that by 1,000 she's
19:33:18 **18** finding the ranges of concentrations at the higher
19:33:18 **19** end that we are.
19:33:20 **20** **Q.** And --
19:33:23 **21** **A.** So we followed the counting rules for
19:33:27 **22** estimating weight percent. She did what we do into
19:33:32 **23** the TEM and did a number count per milligram of talc.
19:33:35 **24** **Q.** Dr. Blount's paper includes a particle
19:33:35 **25** size distribution analysis; correct?
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19:33:39 **1** **A.** Particle size distribution analysis for
19:33:41 **2** the length and size of the asbestos -- tremolite
19:33:45 **3** asbestos she was finding in the PLM, yes.
19:33:47 **4** **Q.** And she plotted the aspect ratios of the
19:33:50 **5** particles she viewed by PLM?
19:33:53 **6** **A.** The fibrous asbestos, yes, she did.
19:33:55 **7** **Q.** She did this because asbestos has a
19:33:57 **8** characteristic distribution?
19:34:00 **9** **A.** Milled tremolite has a characteristic
19:34:04 **10** distribution, yes.
19:34:04 **11** **Q.** Okay. And the nonasbestiform version of
19:34:09 **12** the same amphibole has a different characteristic
19:34:13 **13** distribution?
19:34:13 **14** **A.** Yes, it does.
19:34:14 **15** **Q.** And you did not generate a particle size
19:34:17 **16** distribution chart like the one in Blount's paper --
19:34:22 **17** the ones in Blount's paper in your report?
19:34:23 **18** **A.** Not for the MDL samples, no. We did for
19:34:26 **19** the original analysis so that we could compare it to
19:34:29 **20** the NIST tremolite asbestos standard, to Blount's
19:34:34 **21** particle size, as well as the Campbell particle size.
19:34:39 **22** **Q.** You included a table with average particle
19:34:43 **23** size that your analysts recorded by TEM, however,
19:34:46 **24** though; right?
19:34:46 **25** **A.** Correct.
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19:34:47 **1** **Q.** Dr. Blount included particles in her
19:34:50 **2** particle size distribution that were below the 3-to-1
19:34:53 **3** aspect ratio; correct?
19:34:54 **4** **A.** That's correct.
19:34:54 **5** **Q.** Do you have any other opinions regarding
19:34:57 **6** Dr. Blount's 1990 or 1991 papers in this case beyond
19:35:01 **7** those expressed in your report and that we just
19:35:03 **8** discussed?
19:35:03 **9** **A.** No.
19:35:04 **10** **Q.** Is additional data concerning the samples
19:35:08 **11** upon which you reported for Blount PLM in a file
19:35:11 **12** somewhere in your laboratory but not printed out and
19:35:13 **13** produced?
19:35:14 **14** **A.** No. We've produced everything that we
19:35:17 **15** generated for the MDL.
19:35:19 **16** **Q.** Okay. And all data and material
19:35:22 **17** information generated about your work for the Blount
19:35:25 **18** PLM was produced?
19:35:27 **19** MS. O'DELL: Object to the form.
19:35:28 **20** THE WITNESS: As far as I know, everything
19:35:29 **21** was produced for all the data we collected for
19:35:32 **22** the MDL samples.
19:35:34 **23** **Q.** (By Mr. Chachkes) Okay. And I think I
19:35:35 **24** already know the answer, but I'm going to ask it.
19:35:37 **25** And any of the data you generated for your Blount PLM
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19:35:40 **1** analysis, was any of it thrown away or deleted?
19:35:43 **2** **A.** No. We have many negatives, we have many
19:35:47 **3** positives, so we just reported what we saw.
19:35:50 **4** **Q.** In your report at page 8 you state that
19:35:53 **5** you found fibrous talc in 98 percent of the Italian
19:35:56 **6** and Vermont talc samples by ISO 22262-1; correct?
19:36:00 **7** **A.** That's correct.
19:36:00 **8** **Q.** What's your definition of fibrous talc?
19:36:03 **9** **A.** Has greater than .5 micrometers in length,
19:36:08 **10** has parallel sides, and it has at least 5-to-1 aspect
19:36:12 **11** ratio.
19:36:12 **12** **Q.** Is there a scientific consensus that there
19:36:17 **13** is such a thing as fibrous talc?
19:36:21 **14** MR. CIRSCH: Object to form.
19:36:22 **15** THE WITNESS: I don't believe so.
19:36:22 **16** **Q.** (By Mr. Chachkes) Are you aware of any
19:36:23 **17** epidemiologist or doctor who has studied the health
19:36:26 **18** effects of fibrous talc?
19:36:28 **19** **A.** I don't testify about health effects of
19:36:30 **20** fibrous talc or regulated asbestos, so I don't have
19:36:33 **21** any opinions about that one way or the other if
19:36:35 **22** anybody has studied it. That's not my area.
19:36:37 **23** **Q.** You were disclosed for health and
19:36:39 **24** regulatory definitions of talc; correct?
19:36:41 **25** MS. O'DELL: Object to the form.
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19:36:42 **1** THE WITNESS: I don't believe so.
19:36:43 **2 Q.** (By Mr. Chachkes) Okay. And you're not
19:36:45 **3** here to testify about health and regulatory
19:36:48 **4** definitions of talc?
19:36:49 **5 A.** I'm not testifying that fibrous talc has
19:36:52 **6** any impact on the human body whatsoever.
19:36:55 **7 Q.** Are you aware of any regulatory
19:36:57 **8** definitions of fibrous talc?
19:37:00 **9 A.** Fibrous talc for the protocols that we
19:37:05 **10** follow is not deemed a regulated asbestos fiber. We
19:37:10 **11** just follow the same counting rules that we do for
19:37:13 **12** asbestos to characterize what we're looking at.
19:37:18 **13 Q.** So ISO 22262, parts 1 through 3, they
19:37:22 **14** don't define fibrous talc; correct?
19:37:25 **15 A.** They define anything that is an elongated
19:37:28 **16** structure and fibrous that if you care to write down
19:37:33 **17** your findings you could put it in.
19:37:35 **18 Q.** So they define fibrous talc in that way?
19:37:37 **19 A.** They define elongated fiber materials that
19:37:42 **20** you're going to -- if you wish to count into the TEM,
19:37:46 **21** any elongated structure.
19:37:48 **22 Q.** Okay. And so it's your testimony that ISO
19:37:55 **23** 22262 was meant as a method to count fibrous talc?
19:38:01 **24** MR. CIRSCH: Object to form.
19:38:01 **25** THE WITNESS: I didn't say that.
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19:38:02 **1 Q.** (By Mr. Chachkes) Is it a method to count
19:38:03 **2** fibrous talc? Is it meant as such as method?
19:38:06 **3** MR. CIRSCH: Object to form.
19:38:07 **4** THE WITNESS: I don't know what it was
19:38:08 **5** meant for, but it gives you the tools if you
19:38:10 **6** wish to do that. They don't restrict what you
19:38:13 **7** can or can't count. Nowhere in the method does
19:38:16 **8** it say don't count the fibrous talc.
19:38:19 **9 Q.** (By Mr. Chachkes) And can you identify
19:38:26 **10** anywhere where there's a method and a peer-reviewed
19:38:30 **11** literature or peer-reviewed publication where it
19:38:34 **12** expressly refers to fibrous talc and a method to
19:38:36 **13** count fibrous talc?
19:38:38 **14 A.** All the methods allow you to do that.
19:38:42 **15 Q.** Yeah, I'm not asking about what methods
19:38:44 **16** allow you --
19:38:45 **17 A.** You interrupted me.
19:38:46 **18 Q.** Okay.
19:38:47 **19 A.** It's late.
19:38:47 **20** All the methods give you the tools to do
19:38:49 **21** that if you wish. No method out there says do not
19:38:52 **22** count this particular type of structure. Just like
19:38:55 **23** in Blount, where she counted the particulates and
19:38:58 **24** tried to get a ratio of how many amphibole asbestos
19:39:01 **25** was for every number of particulates. The
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19:39:04 **1** information doesn't change because somebody doesn't
19:39:07 **2** say one way or the other if you should do it.
19:39:10 **3 Q.** It's a simple question, if you would
19:39:12 **4** answer the question I'm actually asking, which is is
19:39:15 **5** there a published or peer-reviewed document that you
19:39:17 **6** can point me to that expressly talks about a way to
19:39:21 **7** count fibrous talc?
19:39:22 **8** MR. CIRSCH: Object to form.
19:39:23 **9 Q.** (By Mr. Chachkes) Putting aside whether
19:39:25 **10** you can use some other method that doesn't say the
19:39:28 **11** phrase fibrous talc -- to count fibrous talc, is
19:39:30 **12** there something that expressly refers to fibrous talc
19:39:32 **13** and a method to count it?
19:39:34 **14** MR. CIRSCH: Object to form.
19:39:35 **15** THE WITNESS: I'd have to go back and
19:39:37 **16** relook. None of the methods say do not count
19:39:39 **17** fibrous talc.
19:39:41 **18 Q.** (By Mr. Chachkes) Sitting here -- okay.
19:39:42 **19** MR. CIRSCH: Let him finish.
19:39:44 **20** THE WITNESS: None of the methods say do
19:39:46 **21** not count fibrous talc.
19:39:47 **22 Q.** (By Mr. Chachkes) Yes, you said that many
19:39:49 **23** times. I'm --
19:39:49 **24** MR. CIRSCH: You're interrupting him
19:39:51 **25** again. Stop. Stop.
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19:39:52 **1** THE WITNESS: Let me start over. I lost
19:39:54 **2** my train of thought.
19:39:55 **3** None of the methods say do not count
19:39:57 **4** fibrous talc. The 7402 -- NIOSH 7402
19:40:01 **5** specifically says if it's fibrous talc, count
19:40:05 **6** it, in TEM. That's one. And I'll have to --
19:40:08 **7 Q.** (By Mr. Chachkes) So --
19:40:10 **8** MR. CIRSCH: You keep interrupting him.
19:40:12 **9** MR. CHACHKES: I'm asking just to save --
19:40:12 **10** MS. O'DELL: No, you're interrupting him.
19:40:14 **11** MR. CIRSCH: You keep doing it, Alex.
19:40:16 **12** THE WITNESS: So that's one.
19:40:17 **13 Q.** (By Mr. Chachkes) NIOSH?
19:40:18 **14 A.** NIOSH 7402 TEM method, where you're
19:40:20 **15** determining the percentage of asbestos -- regulated
19:40:24 **16** asbestos defined by the counting rules versus other
19:40:27 **17** things, and it actually has talc in there.
19:40:30 **18 Q.** Okay. So in there I can look, and it will
19:40:32 **19** say here's how you count fibrous talc?
19:40:35 **20 A.** I don't think they put it that simply.
19:40:38 **21** But if you have knowledge about the protocols and
19:40:41 **22** read through it, you would understand.
19:40:43 **23 Q.** Okay. Putting aside whether there are
19:40:46 **24** documents that don't expressly say you can't use them
19:40:50 **25** for this purpose, is there a document that says this
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19:40:53 **1** is how you count fibrous talc, using the phrase
19:40:56 **2** fibrous talc?
19:40:57 **3 A. They all say it because they say this is**
19:40:59 **4 how you define a fiber. Then how you identify what**
19:41:03 **5 that fiber is, you can make that decision. But every**
19:41:06 **6 one of these TEM protocols say this is the definition**
19:41:09 **7 of a fiber.**
19:41:10 **8 Q.** Putting aside protocols and publications
19:41:16 **9** that talk about fibers generally, and putting aside
19:41:18 **10** your continued insistence on talking about things
19:41:21 **11** that don't say something, is there something that
19:41:23 **12** actually says this is how you count fibrous talc,
19:41:27 **13** using the phrase fibrous talc?
19:41:29 **14** MR. CIRSCH: Object to form.
19:41:33 **15** THE WITNESS: It is my opinion that they
19:41:34 **16** all give you the tools to count fibrous talc.
19:41:37 **17** Do they actually say what every mineral --
19:41:39 **18** elongated particle mineral is that you should or
19:41:42 **19** should not count? I'd have to go back and
19:41:44 **20** check.
19:41:45 **21** I'm going to give you the same answer for
19:41:47 **22** the same question. They all provide you the
19:41:49 **23** tools or the counting procedures to count
19:41:53 **24** whatever elongated particle you want and
19:41:56 **25** identify it.

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19:42:26 **1** MS. O'DELL: CMO 11, as you know, Alex,
19:42:32 **2** requires you to --
19:42:34 **3** MR. CHACHKES: I'm sorry, are you
19:42:35 **4** testifying about a document?
19:42:36 **5** MS. O'DELL: I'm telling you what the
19:42:37 **6** order says.
7 MR. CHACHKES: Oh, okay. I'm sorry.
19:42:38 **8** MS. O'DELL: You may not be aware of the
19:42:39 **9** order since you've not appeared in the MDL, but
19:42:42 **10** it says to --
11 MR. CHACHKES: Actually --
19:42:42 **12** MS. O'DELL: -- treat the witness with
19:42:44 **13** civility and respect.
19:42:46 **14** He's answered your question, and you
19:42:47 **15** should stop badgering him.
19:42:49 **16** MR. CHACHKES: Okay. Your objection's
19:42:51 **17** been made.
19:42:52 **18 Q.** (By Mr. Chachkes) Are fibrous talc and
19:42:53 **19** asbestiform talc different?
19:42:55 **20 A. No.**
19:42:59 **21 Q.** In your report at page 30 you write that
19:43:03 **22** others have reported that fibrous talc is a
19:43:06 **23** geological metamorphic transformation of
19:43:09 **24** anthophyllite to fibrous talc?
19:43:11 **25 A. Yes.**

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19:41:56 **1 Q.** (By Mr. Chachkes) So sitting here today,
19:41:57 **2** you can't tell me a counting protocol that expressly
19:42:01 **3** mentions this is how you count, mentioning the phrase
19:42:04 **4** fibrous talc?
19:42:06 **5** MR. CIRSCH: Object to form. He's
19:42:07 **6** answered the question. I instruct him not to
19:42:09 **7** answer any further.
19:42:11 **8** MR. CHACHKES: You're instructing him not
19:42:12 **9** to answer?
19:42:13 **10** MR. CIRSCH: He answered the question. I
19:42:13 **11** mean, you're badgering him now with the same
19:42:15 **12** question over and over again.
13 MR. CHACHKES: I'm asking a different
19:42:17 **14** question.
19:42:17 **15** MS. O'DELL: Alex, I'm sure you're
19:42:19 **16** aware --
19:42:20 **17** MR. CHACHKES: Who's objecting here?
19:42:21 **18** MS. O'DELL: I'm objecting right here, and
19 I'm sure you're aware --
19:42:22 **20** MR. CHACHKES: Okay. Can we just keep it
19:42:24 **21** to one person? It's a much more controlled
19:42:25 **22** environment when we do that.
19:42:25 **23** MS. O'DELL: Let me -- don't interrupt me.
24 MR. CHACHKES: Okay. Wait. Which Lee is
19:42:26 **25** objecting?

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19:43:12 **1 Q.** Okay. And then you cite a couple of
19:43:15 **2** things. There's an MVA report -- two MVA reports,
19:43:19 **3** right? You can go to page 30, footnotes 42, 43.
19:43:28 **4 A. It should be reference 30, Virta, The**
19:43:44 **5 Phase Relationship of Talc and Amphiboles in a**
19:43:47 **6 Fibrous Talc Sample, Bureau of Mines report is one.**
19:43:50 **7 Veblen, 29, New Bio -- it's late -- I**
19:43:56 **8 can't even pronounce it -- Biopyriboles, Chester,**
19:44:00 **9 Vermont, talks about the polymorph transformation.**
19:44:06 **10 That's how fibrous talc is generated --**
11 Q. Okay.
19:44:08 **12 A. -- is the -- during way back when, during**
19:44:11 **13 pressure and temperature, when you had the liquid**
19:44:12 **14 rock and -- depending on the minerals. Those are two**
19:44:16 **15 references and there's others. I didn't put all of**
19:44:19 **16 them in there.**
19:44:19 **17 Q.** Okay. Let's talk about two references you
19:44:21 **18** did put in. You put in two references to MVA
19:44:24 **19** reports, footnotes 42 and 43; correct?
19:44:55 **20** Am I correct that 42 and 43 --
19:44:58 **21 A. You are correct.**
19:44:58 **22 Q.** Okay. And those are reports prepared for
19:45:01 **23** plaintiffs in talc litigation?
19:45:05 **24** MR. CIRSCH: Object to form.
19:45:06 **25** THE WITNESS: That's my understanding.

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19:45:06 **1** Q. (By Mr. Chachkes) Okay. In your footnote
19:45:09 **2** 42, you have the date of the MVA report as 2018, but
19:45:14 **3** it was actually from 2017; correct?
19:45:18 **4** A. That's correct.
19:45:18 **5** Q. These MVA reports you cite in footnotes 42
19:45:22 **6** and 43, those were not published; correct?
19:45:24 **7** A. No, sir.
19:45:25 **8** Q. And they're not peer-reviewed?
19:45:27 **9** A. As far as I know, they haven't been
19:45:30 **10** published.
19:45:30 **11** Q. And they're not peer-reviewed, are they?
19:45:33 **12** A. Well, if you're talking about
19:45:34 **13** peer-reviewed in a publication, no.
19:45:36 **14** Q. Okay. Is there another form of peer
19:45:41 **15** review you're aware of?
19:45:42 **16** A. Well, any time anybody looks over a report
19:45:46 **17** and writes comments about it, it's peer-reviewed.
19:45:49 **18** Q. So would you call your expert report in
19:45:51 **19** this case peer-reviewed?
19:45:53 **20** A. No, sir.
19:45:55 **21** Q. Didn't Rigler look over it?
19:45:58 **22** A. I'm talking about peer review where people
19:46:00 **23** are looking for the scientific validity of it. It's
19:46:05 **24** not -- as far as I know, the MVA talc analysis has
19:46:09 **25** not been published.
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19:46:10 **1** Q. Okay. And as far as you know, you don't
19:46:13 **2** have any information that it's been peer-reviewed?
19:46:15 **3** MR. CIRSCH: Object to form.
19:46:16 **4** THE WITNESS: You know, I'll give you
19:46:17 **5** that. That's correct.
19:46:17 **6** Q. (By Mr. Chachkes) What is MVA? What does
19:46:21 **7** it stand for?
19:46:22 **8** A. Millette, Vander Wood & Associates.
19:46:24 **9** Q. And both of these reports were authored by
19:46:27 **10** Dr. Steve Compton?
19:46:28 **11** A. Yes, sir.
19:46:28 **12** Q. And you've testified in cases with
19:46:30 **13** Dr. Compton before; correct?
19:46:31 **14** A. I understand he's been in the same cases
19:46:33 **15** as me.
19:46:34 **16** Q. On plaintiffs' side?
19:46:35 **17** MR. CIRSCH: Object to form.
19:46:36 **18** THE WITNESS: Yes, sir.
19:46:36 **19** Q. (By Mr. Chachkes) Okay. He's also an
19:46:38 **20** expert for plaintiffs' attorneys in asbestos
19:46:40 **21** litigation?
19:46:41 **22** A. He has.
19:46:41 **23** Q. Describe how your analysts utilized
19:46:49 **24** process blanks in their analysis.
19:46:51 **25** A. Every set of samples that are prepared, a
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19:46:56 **1** process blank is prepared along with it so that
19:46:59 **2** everything is done exactly the same except no talc.
19:47:03 **3** And then those samples are run through the whole
19:47:07 **4** preparation process, and then they are analyzed in
19:47:09 **5** the same manner as the talc samples.
19:47:13 **6** Q. Do your analysts run a process blank with
19:47:16 **7** every single individual sample?
19:47:17 **8** A. No. Every set of samples that are all
19:47:20 **9** prepared at the same time.
19:47:21 **10** Q. Okay. And so for the MDL samples, what
19:47:24 **11** would constitute a set in that context?
19:47:28 **12** A. Let me look, because Rigler can talk about
19:47:48 **13** it more tomorrow.
19:48:02 **14** So we have a number of blanks, and
19:48:06 **15** typically we have a chart that shows which process
19:48:12 **16** blanks go to which set of samples.
19:48:22 **17** I'll see if Rigler can bring that
19:48:23 **18** tomorrow.
19:48:30 **19** I don't have that information. Typically
19:48:32 **20** we give that.
19:48:32 **21** Q. Why do you say Rigler can bring it
19:48:36 **22** tomorrow? Was he involved in that process?
19:48:38 **23** A. Well, he was involved putting this report
19:48:40 **24** together. And since he's coming tomorrow, maybe he
19:48:43 **25** can get in early enough to say which set of samples
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19:48:46 **1** were analyzed for each process blank.
19:48:49 **2** Q. Sitting here today, even with the report
19:48:51 **3** before you, you can't tell me that?
19:48:53 **4** A. No, I don't see the chart that we have
19:49:01 **5** prepared in the past.
19:49:03 **6** Q. Do your analysts run a process blank with
19:49:06 **7** every sample analyzed by PLM?
19:49:08 **8** A. Well, you don't have anything that you're
19:49:12 **9** generating. A process blank would literally be
19:49:17 **10** putting the glass slide on the polarized light
19:49:20 **11** microscope and looking at it because you're not
19:49:20 **12** filtering anything, you're not using reagents, so
19:49:24 **13** there's no such thing as a process blank in polarized
19:49:27 **14** light microscopy.
19:49:27 **15** Q. Okay. Does the ISO method provide a
19:49:35 **16** process blank protocol?
19:49:38 **17** A. I don't think so.
19:49:39 **18** Q. Do you follow a process blank procedure
19:49:42 **19** pursuant to your lab's standard protocols?
19:49:44 **20** A. Yes.
19:49:44 **21** Q. Is that written down somewhere?
19:49:48 **22** A. I believe so.
19:49:49 **23** Q. All right. We would request that be
19:49:52 **24** produced.
19:49:52 **25** Turning back to your TEM process blanks,
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19:49:55 **1** in your January 2019 report you write that, The
19:49:58 **2** process laboratory blanks were prepared in the exact
19:50:02 **3** manner as the talc samples but without any talc
19:50:04 **4** material.
19:50:05 **5** Does that sound familiar?
19:50:06 **6** **A. It does.**
19:50:06 **7** **Q. Okay.**
19:50:07 **8** **A. I wrote it.**
19:50:08 **9** **Q. Was the first step in your process blank**
19:50:10 **10** **protocol centrifuging a centrifuge tube with just**
19:50:15 **11** **heavy liquid and no talc in it?**
19:50:17 **12** **A. Correct.**
19:50:17 **13** **Q. The first step of your process blank**
19:50:19 **14** **protocol test tests both -- does it test both the**
19:50:25 **15** **centrifuge tube and the heavy liquid for**
19:50:27 **16** **contamination?**
19:50:28 **17** **A. Well, since it's in the centrifuge tube,**
19:50:31 **18** **whatever it's touched would be -- you would be**
19:50:33 **19** **measuring that potential for contamination.**
19:50:36 **20** **Q. It follows that your process blank**
19:50:39 **21** **protocol did not include the portion of your method**
19:50:41 **22** **before centrifugation where you transferred the**
19:50:44 **23** **samples to a balance to be weighed?**
19:50:46 **24** **A. Since we're putting no talc in it, that's**
19:50:49 **25** **correct.**
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19:50:49 **1** **Q. If there was a contamination on the scale,**
19:50:52 **2** **that would not be accounted for in the process blank**
19:50:54 **3** **protocol; correct?**
19:51:00 **4** **A. If. Well, there's no evidence that**
19:51:04 **5** **there's an if in the scale. It's not just taken out**
19:51:09 **6** **and poured onto the scale. You use weigh paper.**
19:51:13 **7** **They're very careful about that.**
19:51:16 **8** **But there is -- so there's no**
19:51:19 **9** **contamination from the scale.**
19:51:20 **10** **Q. But it's fair to say the process blank**
19:51:23 **11** **protocol does not account for potential contamination**
19:51:25 **12** **on the scale, putting aside whether there's**
19:51:27 **13** **contamination or not?**
19:51:28 **14** **A. The process blank is everything that is**
19:51:30 **15** **touched: the liquid, the filtration, the filter, the**
19:51:37 **16** **centrifuge tube, the additional material, the**
19:51:46 **17** **apparatus that holds the filter, all that is checked.**
19:51:50 **18** **Q. My question's about what wasn't checked.**
19:51:53 **19** **Was the scale checked with the process blank**
19:51:55 **20** **protocol?**
19:51:56 **21** **A. You can't check the scale.**
19:51:57 **22** **Q. Okay. When you ran your process blanks,**
19:52:00 **23** **that process did not involve scraping samples out of**
19:52:03 **24** **the MCT tubes; right?**
19:52:09 **25** **A. Scraping samples out of the MC tube -- the**
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19:52:19 **1** **tube is cut with a guillotine. The centrifuge tube**
19:52:24 **2** **is cut with a guillotine. There's no scraping for**
19:52:26 **3** **the TEM.**
19:52:27 **4** **Q. When you ran your process blanks, the**
19:52:30 **5** **process did not involve taking material out of the**
19:52:33 **6** **MCT tubes; right?**
19:52:35 **7** **A. Sure, it did. It's the same way we take**
19:52:38 **8** **the material out when we do the TEM analysis for the**
19:52:41 **9** **process blanks. The end of the tube is cut where the**
19:52:45 **10** **heavy materials -- the heavy minerals are, and then**
19:52:49 **11** **it's run the exact same way.**
19:52:51 **12** **Q. Okay. So the process blank protocol did**
19:52:52 **13** **include the portion of your method where you scraped**
19:52:54 **14** **the centrifuge from the tube which is --**
19:52:56 **15** **A. It's not scraped.**
19:52:57 **16** **MR. CIRSCH: Object to form.**
19:52:58 **17** **THE WITNESS: There's no scraping.**
19:53:00 **18** **Q. (By Mr. Chachkes) Okay.**
19:53:00 **19** **A. The tip is cut with a guillotine after**
19:53:02 **20** **it's been flash frozen in liquid nitrogen, and then**
19:53:07 **21** **that whole tip is put into a solution and then**
19:53:08 **22** **washed. There's no scraping.**
19:53:09 **23** **Q. I'll pick a more palatable verb.**
19:53:13 **24** **It follows that -- so you're saying your**
19:53:14 **25** **process blank protocol included the portion of your**
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19:53:15 **1** **method where you removed from the centrifuge the**
19:53:22 **2** **material with a spatula?**
19:53:27 **3** **A. There's no removing from the centrifuge**
19:53:29 **4** **tube after the spin-down with a spatula.**
19:53:34 **5** **Q. Do you just leave the material in the**
19:53:36 **6** **centrifuge?**
19:53:36 **7** **A. We cut the tip of -- the very bottom of**
19:53:38 **8** **the centrifuge tube off for TEM analysis, and then**
19:53:41 **9** **that whole tip is transferred inside and outside into**
19:53:44 **10** **the solution that is then going to be filtered where**
19:53:47 **11** **you dilute the heavy liquid density material, as we**
19:53:50 **12** **do with the TEM analysis.**
19:53:53 **13** **Q. What percentage of MAS's work is testing**
19:53:55 **14** **talc for asbestos?**
19:53:56 **15** **A. A lot.**
19:54:02 **16** **Q. Over 80 percent?**
19:54:03 **17** **A. I would say right now that our revenue is**
19:54:06 **18** **approximately 70 percent of talc analysis and**
19:54:09 **19** **everything associated with it.**
19:54:10 **20** **Q. Is the remaining --**
19:54:12 **21** **MR. CIRSCH: I don't know if he was --**
19:54:13 **22** **were you done?**
19:54:13 **23** **THE WITNESS: Yeah.**
19:54:13 **24** **Q. (By Mr. Chachkes) Is the remaining**
19:54:15 **25** **percentage primarily testing asbestos?**
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19:54:19 **1 A. Very small percentage of that. Other**
19:54:24 **2 stuff that we do.**
19:54:24 **3 Q. I'm sorry.**
19:54:26 **4 A. Other nonlitigation projects that we do.**
19:54:29 **5 Q. Of the 30 percent of your work that isn't**
19:54:33 **6 testing talc for asbestos, is that -- what's that**
19:54:37 **7 30 percent? What are you testing for?**
19:54:38 **8 A. Well, we do -- like today, I mean, the**
19:54:46 **9 analysts have around 100 regular, everyday PLM. It's**
19:54:49 **10 testing for asbestos but not litigation related.**
19:54:51 **11 Q. Okay. My question didn't really relate to**
19:54:54 **12 litigation related or not.**
19:54:56 **13 Of the percentage of your work that's not**
19:54:57 **14 related to testing talc for asbestos, which is in the**
19:55:01 **15 range of 30 percent, is it primarily testing other**
19:55:03 **16 things for asbestos? Strike that. That was a**
19:55:08 **17 terrible question.**
19:55:08 **18 For the 30 percent of MAS's work that is**
19:55:13 **19 not testing talc for asbestos, is that remainder**
19:55:17 **20 primarily testing for asbestos in other materials or**
19:55:21 **21 testing asbestos itself?**
19:55:22 **22 A. Well, let me back up. All our litigation**
19:55:24 **23 work is approximately 70 percent. I would say talc**
19:55:29 **24 is approximately, of that 70 percent, maybe 35,**
19:55:33 **25 40 percent.**
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19:55:35 **1 And then the other portion of that**
19:55:38 **2 70 percent would be other litigation, other asbestos**
19:55:41 **3 testing, non-talc work. And then we have 30 or**
19:55:45 **4 35 percent nonasbestos work.**
19:55:48 **5 Can we go off the record for a minute?**
19:55:50 **6 MR. CHACHKES: Sure.**
19:55:50 **7 (Off the record.)**
19:56:09 **8 (Recess from 7:56 p.m. to 7:58 p.m.)**
19:58:45 **9 Q. (By Mr. Chachkes) What was the**
19:59:03 **10 approximate dates when MAS tested the samples that**
19:59:05 **11 are discussed in your January 2019 report, from**
19:59:09 **12 approximately what date to what date?**
19:59:11 **13 A. You can look through the chain of**
19:59:12 **14 custodies or look through the -- but I think it was**
19:59:17 **15 like November, December, October, maybe.**
19:59:21 **16 And I want to circle back for a second**
19:59:26 **17 just to clarify. I misspoke earlier. The 70 percent**
19:59:29 **18 is not talc litigation or talc testing. It's**
19:59:33 **19 approximately 30, 35 percent of what we do. The**
19:59:36 **20 remaining 30 percent is nonlitigation work. So I**
19:59:41 **21 know I misspoke earlier.**
19:59:42 **22 Q. Okay. Just to make sure the record's**
19:59:46 **23 clear, so you're saying about 70 percent of your work**
19:59:48 **24 is litigation related, about 30 is not?**
19:59:50 **25 A. Correct.**
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19:59:51 **1 Q. Okay. And of the 70 percent, roughly half**
19:59:54 **2 of that is talc related, the other half is roughly**
19:59:57 **3 asbestos litigation related?**
19:59:59 **4 A. Correct.**
19:59:59 **5 Q. Okay. And of the 30 percent that's not**
20:00:02 **6 litigation related, what percentage of that is**
20:00:06 **7 related to testing for asbestos in any context?**
20:00:09 **8 A. Well, that would be encompassed in the**
20:00:11 **9 70 percent. So I haven't broken that out, but the**
20:00:15 **10 other 30 percent is things like VOC testing for**
20:00:18 **11 consumer reports or just materials analysis or**
20:00:23 **12 projects.**
20:00:25 **13 Q. Just -- what's VOC?**
20:00:28 **14 A. Hmm?**
20:00:28 **15 Q. I don't know what VOC is.**
20:00:30 **16 A. Oh. Volatile organic compounds. It's**
20:00:34 **17 green labeling, furniture testing, pharmaceutical**
20:00:38 **18 work for our FDA certification -- not certification**
20:00:41 **19 but our FDA lab number.**
20:00:44 **20 Q. So --**
20:00:46 **21 MR. CIRSCH: Were you done, Bill?**
20:00:47 **22 THE WITNESS: Yes.**
20:00:48 **23 Q. (By Mr. Chachkes) I recall that I had**
20:00:49 **24 asked you a question about when you did the testing**
20:00:51 **25 for the samples in your report, and you said**
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20:00:54 **1 November, October, December?**
20:00:56 **2 A. It's all in the reports. You can go**
20:00:58 **3 through the chain of custodies, you can see the dates**
20:01:01 **4 on the analysis.**
20:01:01 **5 Q. And what year? 2018?**
20:01:03 **6 A. Yes, sir.**
20:01:03 **7 Q. And during that time frame were you**
20:01:10 **8 testing other samples of talc for asbestos?**
20:01:16 **9 A. Yes.**
20:01:16 **10 Q. And during that time frame were you**
20:01:18 **11 testing other materials, not talc, for asbestos?**
20:01:23 **12 A. Yes.**
20:01:23 **13 Q. In that time frame were you testing**
20:01:25 **14 asbestos?**
20:01:27 **15 A. Well, we were doing regular PLM for**
20:01:32 **16 products for added -- that have asbestos added to it,**
20:01:36 **17 such as chrysotile, typically see chrysotile most of**
20:01:39 **18 the time, some amosite.**
20:01:41 **19 Q. Okay. Any products that you were testing**
20:01:43 **20 that have either tremolite or anthophyllite in them?**
20:01:46 **21 A. Other than cosmetic talc, no.**
20:01:49 **22 Q. How many TEMs does your lab have?**
20:01:51 **23 A. Four.**
20:01:52 **24 Q. Do you use all four at the same time?**
20:01:57 **25 A. If four analysts are busy, yes.**
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20:01:59 **1** Q. Are they all in the same room?
20:02:01 **2** A. No.
20:02:01 **3** Q. Are they each -- do they each have their
20:02:06 **4** own TEM room?
20:02:07 **5** A. Yes.
20:02:07 **6** Q. So in a given TEM room is it just the TEM
20:02:11 **7** there that's for testing?
20:02:13 **8** A. Correct.
20:02:14 **9** Q. There's no PLM or XRD in the TEM room?
20:02:21 **10** A. No.
20:02:21 **11** Q. Do you use the same PLMs for
20:02:27 **12** asbestos-containing material as you use for testing
20:02:29 **13** talc?
20:02:30 **14** A. No. We have a specific PLM scope that has
20:02:35 **15** been modified to enhance sensitivity.
20:02:39 **16** Q. So that PLM is only used for talc?
20:02:41 **17** A. Yes.
20:02:41 **18** Q. Are your talc samples handled in the same
20:02:46 **19** room as asbestos samples?
20:02:47 **20** A. No.
20:02:47 **21** Q. Does MAS have a clean room?
20:02:49 **22** A. We don't have a Class 100 clean room. We
20:02:54 **23** have a specific room set up just for cosmetic talc.
20:02:58 **24** Q. And what steps -- why haven't you
20:03:03 **25** constructed a clean room?
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20:03:06 **1** MR. CIRSCH: Object to form.
20:03:06 **2** THE WITNESS: Because there's no need to.
20:03:08 **3** If there's any work that is done on any of these
20:03:11 **4** materials, they're done in a biological hood so
20:03:17 **5** that if there's any escape of material, it can
20:03:22 **6** be filtered. We don't do a clean room.
20:03:24 **7** Q. (By Mr. Chachkes) Okay.
20:03:24 **8** A. It's a clean hood but not a clean room.
20:03:27 **9** Q. Okay. So your aliquot of a particular
20:03:32 **10** bottle for the purpose of doing a TEM test or whether
20:03:35 **11** it's a PLM test, that aliquot's taken out in a hood?
20:03:38 **12** A. Yes. Your experts have been to our lab
20:03:41 **13** and one will be there tomorrow. You can ask him what
20:03:44 **14** they see when they get there to get their aliquots.
20:03:47 **15** Q. Does MAS test -- strike that.
20:03:49 **16** Does the same analysts who test
20:03:54 **17** asbestos-containing material in your lab, do they
20:03:56 **18** also test for -- test talc for asbestos?
20:03:59 **19** A. No. The same analysts for PLM? I mean, I
20:04:05 **20** guess I need clarification of that question.
20:04:07 **21** Q. How about for TEM?
20:04:08 **22** A. TEM, if we have other samples that are
20:04:11 **23** being run, the same analyst will do that sample, too,
20:04:14 **24** in the TEM.
20:04:15 **25** Q. Do your analysts wear any sort of special
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20:04:18 **1** clothing when testing talcum powder samples for
20:04:21 **2** asbestos?
20:04:21 **3** A. No. They use special hoods. There is no
20:04:28 **4** danger of being exposed to asbestos in the talcum
20:04:33 **5** powder when you're pulling out TEM grids. It's
20:04:37 **6** trapped onto the TEM grids.
20:04:39 **7** There's never been, that I've heard of, of
20:04:41 **8** somebody getting exposed there. Everything is done
20:04:43 **9** in safety hoods. So none of our analysts are being
20:04:46 **10** exposed.
20:04:46 **11** Q. What was -- is it Dr. Rigler?
20:04:50 **12** A. Yes, it is.
20:04:51 **13** Q. What is Dr. Rigler's contribution to your
20:04:55 **14** expert report in this case?
20:04:56 **15** A. His contribution was to review it, to
20:05:00 **16** review all the data, to look at the data, make sure
20:05:04 **17** it's matched in the appropriate places. And he did
20:05:09 **18** the QA/QC report, so you can ask him tomorrow why he
20:05:13 **19** didn't put that one chart in. That's primarily it
20:05:16 **20** for this report.
20:05:17 **21** Q. When you say review the data, does that
20:05:20 **22** mean he reviewed it in the same substantive way that
20:05:24 **23** you did to make sure the analysts did their job?
20:05:26 **24** A. No. But he would review it that the data
20:05:29 **25** is there for the appropriate materials. But he
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20:05:34 **1** doesn't review it like I do.
20:05:36 **2** When I review the data, I review every
20:05:39 **3** sheet, every micrograph, every diffraction pattern so
20:05:44 **4** that I concur with the analysts' findings for the
20:05:48 **5** various tests that we've done.
20:05:50 **6** Q. So is it fair to say that his review is
20:05:55 **7** more sort of, let's say, a typo level and consistency
20:06:02 **8** level as opposed to substantive level?
20:06:05 **9** A. You'll have to ask him how much
20:06:07 **10** substantive level. But he was a TEM microscopist.
20:06:11 **11** He knows what the EDS pattern -- EDXA patterns look
20:06:17 **12** like and what they should be. He looks for the
20:06:20 **13** identification. But his -- but mine's more in depth
20:06:25 **14** on the data than his is.
20:06:27 **15** Q. Okay. Is he qualified to testify about
20:06:32 **16** how EDXA is -- EDSA -- EDXA is run?
20:06:37 **17** A. Sure.
20:06:37 **18** Q. Okay. And he's qualified to testify how
20:06:40 **19** PLM is run?
20:06:40 **20** A. He's not a PLM analyst. I don't know how
20:06:45 **21** much knowledge he has or if he could -- like I could,
20:06:49 **22** take me a while to sit down and actually analyze a
20:06:53 **23** PLM sample.
20:06:53 **24** Q. What about XRD, is he an expert in XRD?
20:07:06 **25** A. I don't believe so.
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20:07:07 1 Q. Okay. What about SAED?
20:07:11 2 A. Could he index a diffraction pattern by
20:07:16 3 hand? You'll have to ask him.
20:07:18 4 Q. Okay. Did he do any sort of substantive
20:07:20 5 review of the SAED patterns?
20:07:23 6 A. He knows the differences between talc
20:07:27 7 patterns and anthophyllite type patterns, but that
20:07:30 8 really was all my responsibility.
20:07:32 9 Q. Okay. Does he have any responsibility for
20:07:36 10 reviewing EDXA readouts?
20:07:40 11 A. He did review them. He knows EDS spectras
20:07:45 12 and the classic ratios of elements, silica to metals,
20:07:51 13 that you would expect for these types of regulated
20:07:56 14 asbestos fibers and bundles.
20:07:58 15 Q. Is he qualified to testify to the same
20:08:05 16 degree and substance as you regarding your January
20:08:08 17 report?
20:08:09 18 A. I don't know. I don't believe -- I don't
20:08:11 19 believe he is as in-depth as I am on this January
20:08:15 20 report with the data. I believe what his
20:08:19 21 responsibility is, he can recognize the appropriate
20:08:22 22 EDS patterns for the appropriate regulated asbestos.
20:08:26 23 He's not a PLM analyst. He has reviewed -- he looks
20:08:31 24 over, makes sure the materials are present, the
20:08:36 25 QA/QC, the chains of custody, that sort of thing.
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20:08:38 1 Q. Could he substitute for you as an expert
20:08:51 2 in the case presenting this report?
20:08:54 3 MR. CIRSCH: Object to form.
20:08:55 4 THE WITNESS: I don't know.
20:08:57 5 Q. (By Mr. Chachkes) That would be a
20:08:58 6 question for him?
20:08:59 7 A. You know, if I leave here and get hit by a
20:09:02 8 bus, I guess we'll find out.
20:09:05 9 Q. Would that be a question for him?
20:09:07 10 A. Hoping that Dr. Longo get hits by a bus so
20:09:11 11 he can step in and take my place?
20:09:12 12 Q. Let's take the latter first.
20:09:14 13 A. You'll have to ask him.
20:09:15 14 Q. Okay. Why did you involve him?
20:09:21 15 A. Because he's one of our senior scientists,
20:09:23 16 and I involved him very early on. Dr. Rigler and I
20:09:27 17 spent a lot of time collaborating together when we
20:09:32 18 initially took on this project.
20:09:34 19 And the main thing was we didn't feel it
20:09:36 20 was the right thing to do to do the TEM long -- what
20:09:40 21 I call the TEM long method, where to get some
20:09:44 22 reasonable detection limits, you have to look at
20:09:46 23 500,000 grid openings. That ties up a TEM too long,
20:09:52 24 and I just didn't think it was very efficient.
20:09:54 25 We talked about the heavy liquid density
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20:09:56 1 separation early on, that that was the way to go, the
20:09:59 2 problems associated with it because of the density of
20:10:03 3 anthophyllite without iron versus iron.
20:10:06 4 Chrysotile issue, I'm sure we'll figure
20:10:09 5 out together on how to extract chrysotile using the
20:10:13 6 old Windsor method with citric acid. He's a very
20:10:18 7 bright scientist.
20:10:19 8 Q. You've issued reports on other bottles of
20:10:22 9 J&J talc not in the MDL where he wasn't a coauthor of
20:10:25 10 the report; correct?
20:10:26 11 A. Is that right?
20:10:27 12 Q. I'm asking.
20:10:28 13 A. I think he's been on every report.
20:10:30 14 MR. CHACHKES: Okay.
20:10:33 15 I think I have no further questions, but
20:10:36 16 there are other people, and I'm just going to
20:10:38 17 maintain the objection I stated at the
20:10:39 18 beginning, which is we'll have to review the
20:10:43 19 enormous amount of data that was belatedly
20:10:45 20 produced and determine whether to re-call the
20:10:46 21 witness.
20:10:46 22 MR. PROST: I'm happy to go now. I don't
20:10:50 23 have much.
20:13:19 24 (Off the record.)
20:13:19 25 MR. CHACHKES: Just to amend what I said
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20:13:21 1 before, I'm going to reserve time after the
20:13:23 2 other defendant or defendants ask their
20:13:27 3 questions, which will give me time to review my
20:13:33 4 notes to see if I'm actually done.
20:13:35 5 EXAMINATION
20:13:35 6 BY MR. PROST:
20:13:35 7 Q. Hi, Dr. Longo.
20:13:35 8 A. Good evening.
20:13:39 9 Q. With respect to Dr. Rigler, did he subject
20:13:41 10 any substantive changes?
20:13:43 11 A. He might have.
20:13:44 12 Q. You don't recall any as you sit here?
20:13:47 13 A. No. I mean, we all have our own editing
20:13:51 14 style. Sometimes he'd say this doesn't make any
20:13:52 15 sense, which is not uncommon with my struggle with
20:13:56 16 the English language.
20:13:57 17 Q. Okay. You mentioned that you do not store
20:14:01 18 talc and asbestos samples in the same room at MAS?
20:14:04 19 A. Correct.
20:14:04 20 Q. Do you store all of your talc samples in
20:14:08 21 the same room regardless of the manufacturer or
20:14:12 22 supplier?
20:14:13 23 A. They are stored in the same room in
20:14:17 24 separate containers, separate sealed bags, and
20:14:21 25 separate locked cabinets.
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20:14:22 **1** Q. Are there other talc samples provided by
20:14:24 **2** other manufacturers or suppliers other than Johnson &
20:14:27 **3** Johnson?
20:14:27 **4** A. Yes.
20:14:28 **5** Q. How many others?
20:14:29 **6** A. A number.
20:14:32 **7** Q. More than five?
20:14:35 **8** A. I don't know.
20:14:37 **9** Q. And these samples span decades from these
20:14:41 **10** other manufacturers as to Johnson & Johnson?
20:14:44 **11** A. Typically.
20:14:44 **12** Q. With respect to fibrous talc, I think I
20:14:49 **13** heard you say this, but fibrous talc is not asbestos;
20:14:52 **14** right?
20:14:53 **15** MS. O'DELL: Object to form.
20:14:54 **16** THE WITNESS: It's not one of the
20:14:55 **17** regulated asbestos types.
20:14:56 **18** Q. (By Mr. Prost) And so no matter the shape
20:14:57 **19** or size or aspect ratio, if it's chemically talc,
20:15:01 **20** it's not asbestos?
20:15:02 **21** A. It is not one of the regulated asbestos
20:15:07 **22** types that we would report as asbestos.
20:15:09 **23** Q. You attempted to quantify the fibrous talc
20:15:13 **24** in your most recent January 15, 2019, report; is that
20:15:19 **25** right?
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20:15:19 **1** A. Yes.
20:15:19 **2** Q. And just describe briefly how you did
20:15:21 **3** that.
20:15:21 **4** A. It's very qualitative. The analyst for
20:15:25 **5** each of these samples going all the way back, they
20:15:28 **6** make an estimate of the number of particles they're
20:15:33 **7** seeing in the grid openings as they go through their
20:15:36 **8** 100 grid openings.
20:15:37 **9** At the end of that analysis, they'll state
20:15:39 **10** that I was typically seeing one or two or three, and
20:15:43 **11** then they'll record one of the typical asbestos talc
20:15:49 **12** fibers, diffraction pattern, EDS.
20:15:52 **13** So it's a qualitative estimate.
20:15:54 **14** Q. In your March 2018 report, did you attempt
20:15:59 **15** to quantify the fibrous talc?
20:16:01 **16** A. We collected the data, as I recall, but I
20:16:05 **17** didn't go through the exercise of just doing the
20:16:07 **18** math.
20:16:08 **19** Q. Why did you change your methodology in the
20:16:11 **20** quantification of fibrous talc between your
20:16:14 **21** March 2018 report and in your most recent report?
20:16:16 **22** MR. CIRSCH: Object to form.
20:16:17 **23** THE WITNESS: I became curious on how much
20:16:20 **24** fibrous talc is in the samples where we're
20:16:22 **25** seeing fibrous talc. Some samples we see it,
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20:16:25 **1** some we don't, especially by TEM. PLM, it's
20:16:29 **2** just about in every sample.
20:16:32 **3** With the heavy liquid density separation,
20:16:35 **4** you know, theoretically, you should be removing
20:16:37 **5** all the fibrous talc along with the platy talc,
20:16:40 **6** but there is some fibers in there.
20:16:42 **7** A true quantitative analysis where -- is
20:16:45 **8** to take any of these samples that have fibrous
20:16:48 **9** talc in and do a regular no heavy liquid density
20:16:53 **10** separation and see how many orders of magnitude
20:16:56 **11** the fibrous talc is compared to what we're
20:16:59 **12** seeing in TEM with the heavy density liquid
20:17:02 **13** separation.
20:17:02 **14** Q. (By Mr. Prost) On page 13 of your
20:17:04 **15** January 2019 report, you quantify it as abundant,
20:17:10 **16** common, or trace; is that right?
20:17:11 **17** A. Yes.
20:17:12 **18** Q. And is there any published or
20:17:16 **19** peer-reviewed literature that guided those
20:17:19 **20** categories, or is that something that you or MAS came
20:17:21 **21** up with?
20:17:22 **22** A. It was our collective -- what would you
20:17:26 **23** say is trace, how do we kind of give some information
20:17:28 **24** about it, because that's what we were doing for a
20:17:31 **25** while.
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20:17:33 **1** Now we're just using the trace as it's one
20:17:37 **2** to three, on average, per opening. And to do the
20:17:41 **3** analysis or do the semiquantitative estimation of the
20:17:45 **4** number of fibrous talc structures per gram, we just
20:17:49 **5** use one per grid opening.
20:17:51 **6** Q. So there is no established standard for
20:17:54 **7** those three categories that you relied upon?
20:17:59 **8** MS. O'DELL: Object to the form.
20:18:00 **9** THE WITNESS: I don't think I've seen a
20:18:02 **10** document that says if you see fibrous talc, if
20:18:04 **11** you only have one or two particles, that it's
20:18:06 **12** trace. And it's not -- it's trace compared to
20:18:08 **13** what you're seeing there so that you can give
20:18:10 **14** some qualitative estimate.
20:18:14 **15** And we were using this before I got the
20:18:17 **16** idea of actually doing a qualitative count based
20:18:21 **17** on one fibrous talc structure per opening.
20:18:27 **18** Q. (By Mr. Prost) Have you done any quality
20:18:29 **19** assurance reports for fibrous talc?
20:18:32 **20** A. No, sir.
20:18:33 **21** Q. And how long have you been analyzing
20:18:43 **22** materials for asbestos content? When is the first
20:18:46 **23** time you did that? How many years ago?
20:18:48 **24** A. The first TEM grids that I ever analyzed
20:18:53 **25** are in a -- stuck on a petri dish and I have it on
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20:18:58 **1** the wall. I think it was about approximately 1985 or
20:19:02 **2** 1986.
20:19:03 **3** Q. Is the first time that you ever documented
20:19:05 **4** fibrous talc 2018?
20:19:07 **5** A. No. I used to do a lot of product ID in
20:19:17 **6** the property damage cases, and one of the
20:19:20 **7** fingerprints for U.S. Gypsum Audicote Acoustical
20:19:26 **8** Plaster was that it had approximately 10 percent
20:19:29 **9** International Talc in it. And International Talc,
20:19:34 **10** obviously, eventually is Vanderbilt Talc when they
20:19:37 **11** bought that. And it was a fibrous talc component, so
20:19:40 **12** we were constantly analyzing for fibrous talc.
20:19:43 **13** Because U.S. Gypsum Audicote was the only
20:19:47 **14** acoustical plaster out there that had a combination
20:19:49 **15** of 10 percent perlite -- excuse me -- 10 percent
20:19:53 **16** chrysotile, 60 percent perlite, approximately
20:19:57 **17** 10 percent fibrous talc, and the rest of it was
20:20:02 **18** bentonite clay, Wyoming type, and then a few
20:20:06 **19** percentages, 2 or 3 percent of calcium carbonate.
20:20:09 **20** That fibrous talc was the fingerprint for
20:20:12 **21** that product. So we spent a lot of time in these
20:20:15 **22** types of situations debating fibrous talc.
20:20:20 **23** And I must have done that -- and that was
20:20:22 **24** when I was doing all the TEM analysis on the product
20:20:25 **25** ID. I bet I analyzed hundreds and hundreds and
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20:20:28 **1** hundreds of samples specifically, besides looking for
20:20:31 **2** the other primary ingredients, is looking at and
20:20:34 **3** making sure if it was U.S. Gypsum Audicote versus
20:20:38 **4** National Gypsum spray -- God, I've forgotten the
20:20:44 **5** name -- or one of the other without the fibrous talc.
20:20:47 **6** Q. That was all industrial talc?
20:20:50 **7** A. Yes.
20:20:50 **8** Q. So the first time you would have
20:20:53 **9** documented the presence of fibrous talc in cosmetic
20:20:56 **10** talc, would that have been 2018?
20:20:58 **11** A. Whenever we first started doing these
20:21:00 **12** analyses. I think that was November, December,
20:21:05 **13** January, or so, in early 2018.
20:21:08 **14** Q. I know you're not giving any medical
20:21:11 **15** causation opinions with respect to disease or ovarian
20:21:18 **16** cancer, am I also correct you're not going to offer
20:21:19 **17** any opinions as to the root of exposure, whether it
20:21:23 **18** be the female reproductive tract versus inhalation;
20:21:23 **19** is that correct?
20:21:23 **20** A. That is correct. I will not be giving
20:21:26 **21** those types of opinions.
20:21:27 **22** Q. You've never been to a talc mine?
20:21:30 **23** A. I still haven't.
20:21:30 **24** Q. You've not studied the geology of the
20:21:34 **25** mines in Vermont or China, have you?
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20:21:37 **1** MR. CIRSCH: Object to form.
20:21:38 **2** THE WITNESS: I am not a geologist. My
20:21:40 **3** role is what's in the bottle.
20:21:41 **4** Q. (By Mr. Prost) Do you agree that the
20:21:44 **5** geologic process that controls the formation of any
20:21:47 **6** given talc deposits are unique?
20:21:49 **7** MS. O'DELL: Object to the form.
20:21:50 **8** THE WITNESS: I'm not a geologist. I
20:21:52 **9** don't know how unique, especially for the
20:21:56 **10** Vermont and Italian mines. We see from those
20:22:01 **11** time periods that they have asbestos.
20:22:02 **12** So I'll let other geologists say how
20:22:05 **13** unique or not unique they are. That's not my
20:22:07 **14** area.
20:22:07 **15** Q. (By Mr. Prost) You would expect the
20:22:09 **16** accessory minerals in any given talc deposit to be
20:22:12 **17** different from one continent to another, wouldn't
20:22:15 **18** you?
20:22:15 **19** MR. CIRSCH: Object to form.
20:22:16 **20** THE WITNESS: I don't have an expectation
20:22:18 **21** one way or the other.
20:22:18 **22** Q. (By Mr. Prost) You can't name for me the
20:22:21 **23** mines in Vermont that would have been sourced for J&J
20:22:24 **24** baby powder, can you?
20:22:26 **25** A. Besides Hammondsville, Argonaut, and
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20:22:30 **1** what's the other one? I'm missing one.
20:22:32 **2** Q. You're not able to break down the samples
20:22:36 **3** that you've tested in your reports pertaining to any
20:22:40 **4** specific mine in Vermont or a year, are you?
20:22:42 **5** A. Without going through all the documents
20:22:44 **6** showing that when you switched from Hammonds -- or
20:22:49 **7** Argonaut, there's specific years in discovery, but I
20:22:50 **8** haven't bothered doing -- I haven't done that, if
20:22:54 **9** it's important.
20:22:54 **10** Q. All right. Do you know when Imerys began
20:22:57 **11** supplying talc for Johnson & Johnson Baby Powder?
20:23:00 **12** A. It's always unclear to me. Of course,
20:23:07 **13** it's the -- in 1980 we have some -- maybe with the
20:23:12 **14** Vermont and the later '80s.
20:23:17 **15** I haven't memorized -- and because we've
20:23:21 **16** been going so long, I'm tired. I've had that
20:23:24 **17** information at the tip of my tongue before, but I
20:23:26 **18** would have to look it back up what Imerys says in
20:23:30 **19** their sworn interrogatories when they started doing
20:23:32 **20** that, as well as Johnson & Johnson when they say they
20:23:34 **21** started buying it versus when it was their own mine
20:23:37 **22** and that sort of thing.
20:23:38 **23** Q. Are you familiar or knowledgeable
20:23:40 **24** regarding the selective mining processes that Imerys
20:23:44 **25** would have used?
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20:23:45 **1 A. Is that like the video where they were**
20:23:47 **2 blowing it up?**
20:23:50 **3 I'm not here to talk about selective**
20:23:52 **4 mining processes or not. My role is just an analysis**
20:23:57 **5 of what's in these particular containers.**
20:24:01 **6 Q. You're not familiar or knowledgeable**
20:24:03 **7 regarding the flotation process that Imerys used over**
20:24:06 **8 the years, are you?**
20:24:07 **9 A. I've read a lot about it. In fact, we're**
20:24:09 **10 going to use one, I believe, with the citric acid to**
20:24:13 **11 try to concentrate the chrysotile if present.**
20:24:17 **12 So without looking at it and going through**
20:24:21 **13 the processes that have been stated in a lot of the**
20:24:25 **14 documents I've read, other than that, no.**
20:24:27 **15 Q. Are you aware of any published literature**
20:24:31 **16 stating that any of the mines used to source**
20:24:35 **17 Johnson & Johnson Baby Powder were contaminated with**
20:24:38 **18 asbestos or amphibole asbestos?**
20:24:40 **19 A. Published literature versus in-house**
20:24:44 **20 testing and company's own stuff?**
20:24:47 **21 Q. Say peer-reviewed literature.**
20:24:49 **22 A. I'm sorry, could you repeat that?**
20:24:52 **23 Q. Are you aware of any peer-reviewed**
20:24:54 **24 literature stating that any of the mines used to**
20:24:56 **25 source Johnson & Johnson's Baby Powder or Shower to**
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20:24:59 **1 Shower were contaminated with amphibole asbestos or**
20:25:02 **2 chrysotile?**
20:25:03 **3 MS. O'DELL: Object to the form.**
20:25:04 **4 THE WITNESS: I mean, the geological**
20:25:06 **5 reports that go back and -- and Alice Blount can**
20:25:10 **6 pick on -- Alice Blount didn't say that this**
20:25:13 **7 came from Vermont. I assume she knows where, as**
20:25:15 **8 a geologist, as a consultant, where that talc**
20:25:18 **9 came for that 1989 or that 1990 bottle of**
20:25:22 **10 Johnson's Baby Powder that she tested to show**
20:25:25 **11 tremolite asbestos.**
20:25:27 **12 But an actual peer-reviewed publication**
20:25:30 **13 stating that the accessory minerals are asbestos**
20:25:33 **14 type or regulated asbestos as counted by these**
20:25:41 **15 standard peer-reviewed protocols, I can't think**
20:25:45 **16 of any.**
20:25:46 **17 Q. (By Mr. Prost) Have you read Alice**
20:25:48 **18 Blount's deposition transcript from the Ingham case?**
20:25:50 **19 A. I have.**
20:25:51 **20 Q. And is it your belief from reading that**
20:25:55 **21 testimony that she's saying that sample I from her**
20:25:59 **22 1990 report was a bottle of Johnson & Johnson Baby**
20:26:03 **23 Powder?**
20:26:03 **24 A. She says it is.**
20:26:03 **25 Q. Did you read where she said she bought**
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20:26:06 **1 that bottle in 1996?**
20:26:10 **2 MR. CIRSCH: Object to form.**
20:26:11 **3 THE WITNESS: Well, that would have been**
20:26:12 **4 hard to go back in time with it. I think she**
20:26:14 **5 also testified that she bought a number of**
20:26:16 **6 bottles over the years.**
20:26:17 **7 Q. (By Mr. Prost) You would agree she was a**
20:26:19 **8 bit confused in her deposition?**
20:26:21 **9 MR. CIRSCH: Object to form.**
20:26:21 **10 THE WITNESS: No, sir, I don't make that**
20:26:23 **11 judgment about anybody.**
20:26:24 **12 Q. (By Mr. Prost) I've heard it read and**
20:26:30 **13 think you've probably been asked this before, but**
20:26:32 **14 would you agree that less than 1 percent of the**
20:26:35 **15 amphiboles in the world are asbestiform?**
20:26:39 **16 MR. CIRSCH: Object to form.**
20:26:40 **17 THE WITNESS: You know, I just don't know**
20:26:51 **18 what 1 percent of probably, I don't know, how**
20:26:54 **19 many zero tons of amphibole's out there.**
20:26:57 **20 Sometimes people seem to suggest that 1 percent**
20:27:00 **21 isn't very much. 1 percent of something really**
20:27:02 **22 big tends to be a lot.**
20:27:04 **23 Q. (By Mr. Prost) You're familiar with**
20:27:05 **24 peer-reviewed studies, though, that have said that;**
25 right?
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20:27:09 **1 A. Yes, sir.**
20:27:09 **2 Q. And you don't have reason to disagree with**
20:27:11 **3 that, do you?**
20:27:13 **4 A. No, sir. I'm just curious on if you were**
20:27:15 **5 to take every amphibole mineral in the world and then**
20:27:18 **6 say only 1 percent of that is asbestos. There**
20:27:22 **7 certainly seems to be enough amphibole asbestos in**
20:27:25 **8 the world to supply a very large contingent of**
20:27:29 **9 products over the years until it got all banned or no**
20:27:33 **10 longer made for amphiboles.**
20:27:34 **11 So I don't have any -- I can't give you a**
20:27:36 **12 relationship what 1 percent means. It's not**
20:27:40 **13 1 percent of a pound. It's 1 percent of -- I don't**
20:27:43 **14 know how many -- how you would weigh it all.**
20:27:47 **15 Q. I know you might think it's still a lot,**
20:27:50 **16 but you have no reason to disagree with the**
20:27:52 **17 peer-reviewed literature that you've seen that has**
20:27:54 **18 said that less than 1 percent of the amphiboles in**
20:28:00 **19 the earth's crust is asbestiform?**
20:28:04 **20 A. No, sir. I just was curious how much of**
20:28:06 **21 the crust is made up of the percentage of what the**
20:28:10 **22 weight is.**
20:28:11 **23 Q. I think I've seen you testify before --**
20:28:13 **24 and I want to see if you still agree -- if an**
20:28:16 **25 amphibole is crystallized in a nonasbestiform habit,**
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20:28:22 **1** no matter how much you can grind it up, it can never
20:28:26 **2** turn into asbestos or asbestiform?
20:28:29 **3** MR. CIRSCH: Object to form.
20:28:30 **4** THE WITNESS: It's unclear to me what an
20:28:33 **5** nonasbestiform habit is other than you may have
20:28:36 **6** massive, blocky. It's all a geological shape.
20:28:39 **7** If you grind up a rock, you do not produce
20:28:44 **8** asbestos. If you grind up tremolitic -- massive
20:28:50 **9** tremolitic, you typically will get both, but you
20:28:53 **10** will not get bundles.
20:28:55 **11** What we do is count it as regulated
20:28:58 **12** asbestos per the protocols.
20:29:01 **13** Q. (By Mr. Prost) Right. So if it
20:29:03 **14** crystallizes in a nonasbestiform habit, tremolite,
20:29:06 **15** for example, and you grind it up and it falls under
20:29:09 **16** the counting rules you use, you call it asbestiform,
20:29:12 **17** regardless; right?
20:29:14 **18** MR. CIRSCH: Object to form.
20:29:15 **19** THE WITNESS: Well, everything we've
20:29:17 **20** looked at has crystallized in a fibrous habit.
20:29:20 **21** Asbestiform habit and fibrous habit are the same
20:29:23 **22** thing because we're looking at fibers.
20:29:25 **23** If you look at all the crystalline habits,
20:29:27 **24** there's a wide range, and most of them are not
20:29:29 **25** fibrous, only one where they would call fibrous.
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20:29:33 **1** But you're not going to get an asbestiform
20:29:36 **2** bundle from grinding up cleavage fragments.
20:29:40 **3** Q. (By Mr. Prost) I'm not talking about what
20:29:42 **4** you've seen or looked at or issued in your report;
20:29:44 **5** but just hypothetically, if you have nonasbestiform
20:29:47 **6** tremolite or amphibole that's crystallized in a
20:29:50 **7** nonasbestiform habit, no matter -- if someone were to
20:29:54 **8** grind that up so that the shape came out to be, under
20:29:58 **9** the counting rules that you go by, you would still
20:30:00 **10** call that asbestiform?
20:30:03 **11** MR. CIRSCH: Object to form.
20:30:04 **12** THE WITNESS: Well, it's a hypothetical I
20:30:05 **13** don't believe exists. If you grind up a rock or
20:30:08 **14** something that's massive, you get little pieces,
20:30:10 **15** irregular shapes. To get a perfectly parallel
20:30:15 **16** side I think is rare.
20:30:17 **17** And you have to look at what else we're
20:30:20 **18** seeing here. Every bundle is asbestiform. And
20:30:25 **19** you would think you would have the same type of
20:30:27 **20** crystalline habit that is generating both
20:30:31 **21** asbestiform as well as some cleavage fragments.
20:30:34 **22** We do see cleavage fragments. But it's my
20:30:38 **23** belief you get both. It's never one or the
20:30:40 **24** other.
20:30:40 **25** Q. (By Mr. Prost) If an amphibole is
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20:30:42 **1** fibrous, in your opinion, is it necessarily
20:30:44 **2** asbestiform?
20:30:47 **3** A. In my opinion, if it is fibrous, it is
20:30:49 **4** asbestiform because it has a form like asbestos.
20:30:52 **5** Q. Are you aware of any peer-reviewed studies
20:30:55 **6** to support that?
20:30:59 **7** A. Other than --
20:31:00 **8** Q. I'm sorry, that if an amphibole is
20:31:02 **9** fibrous, it necessarily has to be asbestiform?
20:31:06 **10** A. You know, other than the geological
20:31:09 **11** definition for a crystalline habit and that it is
20:31:12 **12** fibrous and, you know, whatever the population is,
20:31:16 **13** population is more than one.
20:31:18 **14** But we're getting enough data now that
20:31:20 **15** these populations -- and you just can't -- you know,
20:31:25 **16** no longer look at from a sample from the same mine
20:31:30 **17** that it's a unique thing.
20:31:31 **18** All the samples from the mine that we're
20:31:33 **19** seeing over and over again show asbestiform minerals
20:31:37 **20** in it, specifically tremolite series and the
20:31:39 **21** anthophyllite series.
20:31:42 **22** It's just my opinion. I mean, others may
20:31:44 **23** disagree, but that's my opinion.
20:31:45 **24** Q. Is there a specific article or
20:31:48 **25** peer-reviewed literature or study that says if you
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20:31:50 **1** have an amphibole and it's in a fibrous form, that it
20:31:53 **2** is necessarily asbestos or asbestiform?
20:31:57 **3** MR. CIRSCH: Object to form.
20:31:58 **4** THE WITNESS: Every protocol that we're
20:31:59 **5** using here has a definition of what you call a
20:32:01 **6** regulated asbestos. Everything that I have
20:32:04 **7** reported has followed the peer-reviewed
20:32:06 **8** protocols and methods to say it is a regulated
20:32:09 **9** asbestos that is fibrous to whatever degree they
20:32:12 **10** use for their counting rules. In my opinion,
20:32:14 **11** that makes it all asbestiform.
20:32:15 **12** Q. (By Mr. Prost) So the counting rules and
20:32:16 **13** the protocols that you used for your reports are what
20:32:22 **14** you're talking about?
20:32:22 **15** A. Yes, sir.
20:32:23 **16** Q. No other articles or papers that you can
20:32:26 **17** think of?
20:32:26 **18** A. Not as I sit here this second, no.
20:32:28 **19** Q. Are you aware of any peer-reviewed
20:32:30 **20** articles or literature that say the opposite, that
20:32:32 **21** you can have fibrous amphiboles that are not
20:32:35 **22** asbestiform?
20:32:37 **23** A. There's a couple.
20:32:39 **24** MS. O'DELL: Object.
20:32:40 **25** Q. (By Mr. Prost) And who would those be
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20:32:41 1 from?

20:32:41 2 A. Oh, I think Ann Wylie has published one or

20:32:44 3 two. Just depends on who the authors are.

20:32:48 4 Q. And you just disagree with that?

20:32:50 5 A. Well, I don't agree with their opinions

20:32:52 6 that if it is a bundle. But I disagree that if you

20:32:56 7 take an individual fiber that you can't tell one way

20:32:59 8 or the other because it has the same chemistry, it

20:33:03 9 has the same crystalline pattern, it has the same

20:33:07 10 surface charge, and it's called a regulated asbestos

20:33:10 11 fiber, if it meets all that counting criteria. In my

20:33:15 12 opinion, if it is fibrous and it is asbestos, it is

20:33:19 13 asbestiform.

20:33:20 14 Q. I know you think that or you testified

20:33:23 15 that high tensile strength and flexibility don't mean

20:33:26 16 much because they can't be measured, I think; is that

20:33:29 17 a fair way of describing what you've said or what

20:33:32 18 your opinion is?

20:33:33 19 A. Well, it's not defined. And both the

20:33:36 20 polarized light microscope as well as the

20:33:39 21 transmission electron microscope do not have any

20:33:43 22 ability to make those measurements. It's just a

20:33:45 23 general description.

20:33:47 24 Q. Wouldn't you agree that there's ways to

20:33:50 25 observe whether something has high tensile strength

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20:33:53 1 and flexibility?

20:33:54 2 A. Sure. If you go to the mine and get a --

20:33:57 3 I think a 10 centimeter sample is the minimum, and

20:34:00 4 tape it to paper and go put it on an Instron, which

20:34:03 5 is a device that will measure tensile strength, I

20:34:07 6 wouldn't want to be standing around when you do it.

20:34:10 7 Because when they pop, they'll spread fibers

20:34:14 8 everywhere because you're just dealing with large

20:34:17 9 bundles.

20:34:17 10 With a transmission electron microscope,

20:34:19 11 with a polarized light microscope, or even XRD, it's

20:34:22 12 impossible. There is no ability to make that

20:34:25 13 measurement. And standard protocols for making

20:34:29 14 determinations or measurements lay out how you do

20:34:31 15 that. They don't even define what high tensile

20:34:35 16 strength is.

20:34:36 17 Q. Under PLM, is it your opinion that --

20:34:40 18 sounds like it is your opinion -- it is impossible to

20:34:43 19 make a determination whether a population of fibers

20:34:48 20 or a bundle has high tensile strength or flexibility?

20:34:52 21 A. It is impossible. And they don't provide

20:34:56 22 you any method for doing that.

20:34:57 23 Q. In terms of curvature, splayed ends,

20:35:03 24 parallel sides, that sort of thing, you don't think

20:35:04 25 that gives any guidance on the observance of high

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20:35:08 1 tensile strength and flexibility?

20:35:09 2 MR. CIRSCH: Object to form.

20:35:10 3 THE WITNESS: No. You know, if you're

20:35:13 4 going to look at the published literature for

20:35:14 5 high tensile strength for chrysotile, amosite,

20:35:18 6 and crocidolite, you're running around 90,000 to

20:35:21 7 120,000 psi.

20:35:22 8 If you look at what the characteristics or

20:35:25 9 tensile strength is for tremolite anthophyllite,

20:35:27 10 it's about 4,000 psi, and it's brittle. And

20:35:31 11 you're milling it.

20:35:32 12 So if you can see the bundles at times

20:35:35 13 that we get, you can see where it has been

20:35:38 14 milled and broken in half. There's nothing

20:35:41 15 there to do that.

20:35:42 16 When we identify regulated asbestos in the

20:35:45 17 PLM method, it meets the criteria for what they

20:35:49 18 say is regulated. It has -- those individual

20:35:52 19 fibers and those bundles are all greater,

20:35:55 20 typically, on average, greater than 20-to-1.

20:35:58 21 They can be broken down to smaller fibers

20:36:00 22 and bundles. It's greater than -- the width of

20:36:04 23 the structure is greater than 5 micrometers. It

20:36:07 24 meets the criteria for the ISO 22262-2.

20:36:11 25 Nowhere in any of that method does it tell

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20:36:14 1 you, oh, you better measure the tensile

20:36:17 2 strength.

20:36:17 3 Q. (By Mr. Prost) The 34 or 35 samples from

20:36:21 4 your March 2018 report, you're still relying upon the

20:36:25 5 results of that report here in the MDL; is that

20:36:29 6 right?

20:36:29 7 A. No, I'm not. I'm relying on the MDL

20:36:32 8 report. The only thing that the MDL does is verify

20:36:36 9 our earlier findings, but I'm not relying on it here.

20:36:38 10 Q. Well, your MDL report includes the

20:36:40 11 findings of positive of what you're calling asbestos,

20:36:44 12 though, in those -- in terms of your computations of

20:36:47 13 the percentages?

20:36:47 14 A. I'm sorry, could you repeat that?

20:36:49 15 Q. Sorry, it was -- yeah, clumsy.

20:36:51 16 In your January 2019 MDL report, you're

20:36:54 17 including the findings of those original Johnson &

20:36:58 18 Johnson samples, those 35 in your overall

20:37:01 19 percentages, aren't you?

20:37:02 20 A. No. The only thing that's in there that

20:37:04 21 came from the original report is that MDL sample, the

20:37:10 22 1978 MDL sample. That's the only sample.

20:37:15 23 Q. You changed your methodology from the

20:37:19 24 March 2018 report until now. Why did you do that?

20:37:22 25 MR. CIRSCH: Object to form.

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20:37:23 **1** THE WITNESS: Because we -- we didn't
20:37:27 **2** really change it. We just started using the
20:37:31 **3** definitions and the ability for the ISO 22262-2
20:37:35 **4** because it's an International Standard that has
20:37:37 **5** been peer-reviewed by all the international
20:37:41 **6** scientists that are on it or in the committees,
20:37:44 **7** and it provides a standard method other than
20:37:47 **8** just the Blount heavy density liquid separation
20:37:50 **9** and TEM.
20:37:51 **10** **Q.** (By Mr. Prost) Is the method you're doing
20:37:53 **11** now more reliable than what you did last year?
20:37:55 **12** **A.** **No.**
20:37:56 **13** MR. CIRSCH: Object to form.
20:37:56 **14** THE WITNESS: They are both reliable.
20:37:59 **15** **Q.** (By Mr. Prost) Is your concentration
20:38:02 **16** preparation any different now than what you did in
20:38:07 **17** early 2018, that first report?
20:38:10 **18** **A.** **No. We are using the exact same method,**
20:38:16 **19** **except the ISO 22262-2 says use heavy density liquid**
20:38:22 **20** **of 2.85, if I remember, and Blount had said 2.81.**
20:38:30 **21** **So now I have a method that specifically**
20:38:32 **22** **uses 2.85 that we have been using under Blount.**
20:38:37 **23** **Q.** For the Johnson & Johnson MDL samples, I
20:38:43 **24** think you testified that some of those containers had
20:38:48 **25** been previously opened?
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20:38:51 **1** MS. O'DELL: Object to the form.
20:38:53 **2** THE WITNESS: Well, they got previously
20:38:55 **3** opened when they were split. I don't have any
20:38:59 **4** history on what Johnson & Johnson did with
20:39:03 **5** those, but certainly when they got split up in
20:39:06 **6** New Jersey for samples, they were opened in some
20:39:10 **7** manner.
20:39:10 **8** **Q.** (By Mr. Prost) The Imerys samples, the
20:39:12 **9** railcar samples, I haven't seen any photographs of
20:39:16 **10** those, and I think when we talked last time you said
20:39:19 **11** you could produce those?
20:39:20 **12** **A.** **Oh, I forgot. Yes.**
20:39:21 **13** **Q.** You do have photos of those somewhere that
20:39:23 **14** you can produce them?
20:39:23 **15** **A.** **Yes. It should -- I'll endeavor to get**
20:39:27 **16** **those.**
20:39:27 **17** **Q.** All right. I guess we'll ask that those
20:39:30 **18** be produced.
20:39:30 **19** You're not familiar with how Imerys stored
20:39:35 **20** those samples before they were produced; right?
20:39:38 **21** **A.** **No.**
20:39:38 **22** **Q.** Or what specific mines they came out of?
20:39:42 **23** MS. O'DELL: Object to the form.
20:39:43 **24** THE WITNESS: Well, I guess it would be
20:39:45 **25** easy to track down if there is information and
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20:39:49 **1** testimony about when different mines were
20:39:52 **2** started and stopped.
20:39:53 **3** **Q.** (By Mr. Prost) Your opinion on fibers per
20:40:09 **4** gram and your extrapolation from what you found in
20:40:12 **5** the samples, am I correct that you are assuming that
20:40:17 **6** the asbestos contamination is consistent throughout
20:40:21 **7** the entire sample?
20:40:23 **8** **A.** **The accessory mineral -- the findings of**
20:40:25 **9** **the asbestos accessory minerals is consistent**
20:40:30 **10** **throughout. That's not me assuming it. That's the**
20:40:33 **11** **protocol. Because all TEM analysis, air samples,**
20:40:37 **12** **water samples, when you filter it or pull through a**
20:40:40 **13** **filter, you make that assumption.**
20:40:41 **14** **Q.** Your calculations assume that the fibers
20:40:44 **15** are present at the same levels and evenly distributed
20:40:48 **16** throughout every milligram of the sample; is that
20:40:53 **17** right?
20:40:53 **18** MR. CIRSCH: Object to form.
20:40:54 **19** THE WITNESS: That there will be -- this
20:40:55 **20** is what the range is that we should find, as we
20:41:00 **21** talked about ad nauseam -- I'm sorry -- we
20:41:04 **22** talked about earlier.
20:41:05 **23** If we found one and analyzed it again and
20:41:07 **24** found zero, that would not be surprising because
20:41:10 **25** we're right at the detection limit. But if we
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20:41:12 **1** found a significant number, 10, 15, 25, I would
20:41:17 **2** expect that we would find positive samples in
20:41:19 **3** each and every -- if we were to do that and do
20:41:22 **4** that for some time, that there is enough in
20:41:26 **5** there that would make that where we would find
20:41:28 **6** similar concentrations.
20:41:29 **7** **Q.** (By Mr. Prost) So at the detection limit
20:41:34 **8** level where you're only finding a couple of fibers,
20:41:38 **9** you wouldn't be surprised to examine the same sample
20:41:42 **10** and not have a nondetect; is that right?
20:41:44 **11** **A.** **That wouldn't surprise me, and it wouldn't**
20:41:46 **12** **surprise me if we had found two fibers the first time**
20:41:49 **13** **or two asbestos -- regulated asbestos structures the**
20:41:52 **14** **first time and next time you find four. So you will**
20:41:54 **15** **have a range at those lower detection limits.**
20:41:58 **16** **Q.** Have you ever done a study to verify the
20:42:02 **17** consistency of distribution throughout an entire
20:42:06 **18** sample?
20:42:06 **19** **A.** **No. On the distribution and consistency**
20:42:10 **20** **we haven't done any additional analysis that anybody**
20:42:13 **21** **else has ever done in the past for analyzing these**
20:42:17 **22** **same type of samples other than we're using a more**
20:42:21 **23** **sensitive method.**
20:42:21 **24** **Q.** You were shown an EDS -- EDXA spectra. I
20:42:25 **25** think it was Exhibit 12 maybe, if you could pull that
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20:42:30 **1** up.
20:42:41 **2** MR. CIRSCH: You can use this one for now.
20:42:43 **3** THE WITNESS: Oh, thank you.
20:42:44 **4** **Q.** (By Mr. Prost) You were asked some
20:42:45 **5** questions about how at the bottom there's references
20:42:47 **6** to the different -- what do you call it -- not
20:42:51 **7** minerals -- the components. You see what I'm talking
20:42:55 **8** about at the very bottom?
20:42:59 **9** **A.** **In the bottom left-hand corner?**
20:43:01 **10** **Q.** Correct.
20:43:02 **11** **A.** Yes.
20:43:02 **12** **Q.** Thanks.
20:43:03 **13** And you said, I think, that you weren't
20:43:05 **14** sure if the software automatically pulled up those
20:43:07 **15** calculations or the ratios, the different numbers; is
20:43:10 **16** that right?
20:43:12 **17** **A.** **That's correct.**
20:43:13 **18** **Q.** All right.
20:43:14 **19** **A.** **It's not so much the ratios; it's that you**
20:43:17 **20** **can do it by elemental percentage or the oxides.**
20:43:20 **21** **Q.** If the software automatically pulled that
20:43:23 **22** up, your analyst wouldn't delete it before they
20:43:25 **23** printed that, would they?
20:43:25 **24** MR. CIRSCH: Object to form.
20:43:28 **25** THE WITNESS: No. If it is on there for
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20:43:30 **1** that particular software, it would be a toggle
20:43:33 **2** switch they would either turn on or turn off.
20:43:35 **3** What's more important is we're following
20:43:36 **4** the ISO method for quantitative EDS where we
20:43:41 **5** have collected the appropriate count times.
20:43:44 **6** **Q.** (By Mr. Prost) So the analyst could flip
20:43:46 **7** a switch, and it could produce those specific
20:43:49 **8** calculations for us?
20:43:51 **9** **A.** **I don't know that.**
20:43:52 **10** MR. CIRSCH: Object.
20:43:53 **11** THE WITNESS: It was talked about at
20:43:55 **12** length earlier. It's not something we routinely
20:43:57 **13** do or I'm relying on.
20:44:03 **14** **Q.** (By Mr. Prost) Is there anything else
20:44:04 **15** that you can think of where there's a switch that you
20:44:08 **16** could turn off information that the software was to
20:44:10 **17** automatically put on there?
20:44:12 **18** MS. O'DELL: Object to form.
20:44:13 **19** MR. CIRSCH: Objection.
20:44:13 **20** THE WITNESS: I never stated that the
20:44:16 **21** software automatically wants to do it and the
20:44:18 **22** analysts are fighting with the software where
20:44:21 **23** the software is saying, no, no, I need to do
20:44:22 **24** this.
20:44:22 **25** **Q.** (By Mr. Prost) I'll rephrase the
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20:44:23 **1** question.
20:44:23 **2** Are you aware of any other information
20:44:25 **3** that is available on the software that is not on
20:44:29 **4** there or that there's a switch that has turned it
20:44:32 **5** off?
20:44:32 **6** **A.** **Again, as I discussed earlier some many**
20:44:35 **7** **hours ago, that I would have to check, if my client**
20:44:40 **8** **asks. And if my client asks for me to check, I'll**
20:44:42 **9** **certainly take it under serious consideration.**
20:44:45 **10** MR. PROST: That's all I have for now.
20:44:46 **11** THE WITNESS: Thank you.
20:44:47 **12** MR. PROST: Alex, do you have some more
20:44:49 **13** questions?
20:44:49 **14** MR. CHACHKES: No.
20:45:00 **15** (Recess from 8:45 p.m. to 8:55 p.m.)
20:56:20 **16** EXAMINATION
20:56:25 **17** BY MS. O'DELL:
20:56:25 **18** **Q.** Dr. Longo, it's been a very long day,
20:58:09 **19** but --
20:58:10 **20** **A.** **Yes, ma'am, it has.**
20:58:11 **21** **Q.** It has, I know, for you. I have a few
20:58:14 **22** questions for you.
20:58:16 **23** First, before we begin, would you please
20:58:19 **24** describe your educational background, your background
20:58:24 **25** and expertise.
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20:58:26 **1** **A.** **Yes. My educational background is that I**
20:58:31 **2** **graduated from the University of Florida with a**
20:58:32 **3** **bachelor's of science in microbiology. Went on to**
20:58:35 **4** **graduate school in the materials science department**
20:58:38 **5** **and graduated in 1983 with a Ph.D. in materials**
20:58:41 **6** **science and engineering.**
20:58:42 **7** **I started a small company, and we were one**
20:58:45 **8** **of the first TEM labs in the country that specialized**
20:58:48 **9** **in the analysis of asbestos by transmission electron**
20:58:53 **10** **microscopy. Went on to in 1988 open the doors of**
20:58:57 **11** **Materials Analytical Services and have been there**
20:59:00 **12** **ever since as president.**
20:59:01 **13** **While I was at the University of Florida,**
20:59:03 **14** **I stayed on while I started that first little company**
20:59:06 **15** **and eventually became visiting assistant professor at**
20:59:10 **16** **the University of Florida, which I gave up that**
20:59:12 **17** **position in approximately 1986 or so.**
20:59:17 **18** **Materials Analytical Services grew at some**
20:59:20 **19** **point to almost 80 employees, where we specialized in**
20:59:24 **20** **everything from analysis of asbestos to materials to**
20:59:29 **21** **semiconductors, even doing work for the Department of**
20:59:33 **22** **Defense on various types of contracts.**
20:59:37 **23** **Since that time, we've probably analyzed**
20:59:41 **24** **somewhere in the order of 300,000 or 400,000**
20:59:44 **25** **individual asbestos samples. We worked with various**
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20:59:49 1 states and agencies in litigation for property damage
 20:59:52 2 and developed techniques for reverse engineering
 20:59:56 3 asbestos-containing products so you could identify
 20:59:57 4 the manufacturer.

20:59:59 5 And I was the expert for the City of
 21:00:02 6 New York, the State of New York, the State of Hawaii,
 21:00:08 7 the State of Utah, the City of Chicago, plus the
 21:00:13 8 entire school system and public buildings in the
 21:00:18 9 State of Texas.

21:00:20 10 We were the referee lab for the
 21:00:23 11 bankruptcies that involved both U.S. Gypsum,
 21:00:25 12 W.R. Grace, U.S. Mineral as well -- additionally,
 21:00:29 13 Turner & Newall's Limpet, as the referee lab where if
 21:00:33 14 somebody had made a claim, it was up to us to
 21:00:36 15 validate that the particular sample coming out of a
 21:00:39 16 particular building was, in fact, that manufacturer's
 21:00:44 17 product.

21:00:44 18 I have published in the peer-reviewed
 21:00:47 19 literature on the types of testing that we've done
 21:00:50 20 for both asbestos and nonasbestos type products.

21:00:55 21 I have taught at the American Industrial
 21:01:01 22 Hygiene Association for teaching other industrial
 21:01:04 23 hygienists the utility of transmission electron
 21:01:06 24 microscopy specifically for asbestos as well as other
 21:01:09 25 industrial hygiene applications for particle size
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21:02:56 1 won't do it again.
 21:02:57 2 And I'm a member of various organizations.
 21:03:03 3 The American Industrial Hygiene Association, the
 21:03:13 4 microscopy -- materials science microscopy, as well
 21:03:16 5 as I'm a board certified forensic engineer, which is
 21:03:19 6 not just pay your money; you actually have to qualify
 21:03:22 7 from your experience and renew that. I finally
 21:03:26 8 became a fellow in forensic engineering for what I
 21:03:30 9 do.

21:03:31 10 I guess that's it.

21:03:32 11 Q. Have you been qualified as an expert in
 21:03:37 12 asbestos testing and allowed to testify in federal
 21:03:42 13 court?

21:03:42 14 A. Yes. I've been in federal court many
 21:03:46 15 times on our asbestos type work, and in fact I've had
 21:03:49 16 a handful of appellate opinions that the methodology
 21:03:53 17 we use is sound science. I've been qualified as both
 21:03:57 18 a materials scientist in the areas of microscopy, in
 21:04:02 19 the areas of asbestos analysis, in the areas of
 21:04:06 20 industrial hygiene specifically to do with asbestos.
 21:04:09 21 And I'm still not a certified industrial hygienist.

21:04:12 22 Q. What were you asked to do in this case?

21:04:15 23 A. I was asked to determine, using standard
 21:04:18 24 protocols, peer-reviewed protocols that are normally
 21:04:22 25 used for the determination of asbestos in materials,
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21:01:13 1 analysis, fugitive type particulates for air quality.
 21:01:20 2 Our laboratory is one of the few in the
 21:01:23 3 country that does VOC testing for all the green
 21:01:27 4 labeling. We're certified to do that by the ISO
 21:01:30 5 certification.

21:01:31 6 Our laboratory also has an FDA laboratory
 21:01:34 7 number so that we do do pharmaceutical or UPS type
 21:01:40 8 testing to verify, typically, different chemicals and
 21:01:47 9 materials that may be emitted or inhaled or injected
 21:01:52 10 or taken by mouth.

21:01:54 11 I've been doing this for almost 30 years,
 21:01:57 12 and my specialty has been and my research over the
 21:02:01 13 years has been asbestos-containing products and the
 21:02:05 14 propensity or not to cause significant exposure
 21:02:08 15 during the use of those products.

21:02:11 16 I was the primary author of the ASTM
 21:02:15 17 Method for the Analysis of Asbestos Fibers and
 21:02:18 18 Bundles in Settled Dust, the D2205 committee for ASTM
 21:02:26 19 standard method, which is probably the most rigorous
 21:02:30 20 peer-reviewed methodology outside of ISO.

21:02:33 21 To get your committee -- your
 21:02:38 22 subcommittee, your committee, and eventually all
 21:02:42 23 40,000 members have the ability for the final time
 21:02:47 24 when it becomes a standard to vote negative on it.
 21:02:52 25 One negative vote sends it back. I did that once. I

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21:04:27 1 air, bulk samples, water samples, what have you, if
 21:04:31 2 there was in fact regulated asbestos in these
 21:04:35 3 containers of Johnson & Johnson Baby Powder, Shower
 21:04:43 4 to Shower during the time that Johnson & Johnson was
 21:04:47 5 manufacturing that before they sold it to Valeant,
 21:04:51 6 Valeant Pharmaceuticals.

21:04:53 7 And using standard methodology to
 21:04:56 8 determine if there was detectable amounts of
 21:04:58 9 regulated asbestos in these containers, historical
 21:05:02 10 containers as well as more contemporary containers.
 21:05:08 11 For this particular case for the MDL we have not
 21:05:13 12 gotten to the MDL China mines but to verify if it
 21:05:18 13 was, in fact, present or not.

21:05:20 14 Q. Okay. Is the methodology that you used in
 21:05:25 15 your work in this case supported by the peer-reviewed
 21:05:32 16 literature?

21:05:32 17 A. Yes. We're using standard protocols that
 21:05:34 18 other scientists in the field of asbestos testing
 21:05:36 19 have used in the years.

21:05:38 20 If there's a publication involving
 21:05:40 21 asbestos analysis of some sort or asbestos in some
 21:05:44 22 product or asbestos release, the protocols that we
 21:05:49 23 use are typically referenced in those peer-reviewed
 21:05:51 24 publications as well as these are standards, standard
 21:05:55 25 testing protocols that are accepted across the

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21:05:59 **1** country for these types of analysis and across the
21:06:02 **2** world, especially the International Standards
21:06:05 **3** organization protocols that we use.
21:06:07 **4** Q. And is that because of the methodology
21:06:08 **5** that you use and because of the fact that it's
21:06:12 **6** generally accepted in the scientific community, is
21:06:14 **7** the process that you undertook here something that
21:06:18 **8** could be replicated by another scientist or lab?
21:06:24 **9** MR. PROST: Objection --
21:06:24 **10** MR. SILVER: Objection to form.
21:06:24 **11** MR. CHACHKES: Objection. Leading.
21:06:26 **12** MS. WOODS: Join.
21:06:26 **13** THE WITNESS: Absolutely. They just would
21:06:28 **14** follow the methodology that we have laid out in
21:06:29 **15** the reference protocols, and as long as they are
21:06:32 **16** qualified that they can do this type of
21:06:34 **17** analysis, they should all be able to be
21:06:37 **18** replicated.
21:06:39 **19** Q. (By Ms. O'Dell) Let's talk about your
21:06:40 **20** results just very briefly.
21:06:45 **21** What were your find -- let me back up and
21:06:48 **22** ask this question.
21:06:49 **23** What time period did the samples you
21:06:51 **24** tested for your January 2019 report, what time period
21:06:56 **25** does that cover?
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21:06:58 **1** A. The 1960s, the 1970s, the 1980s, the
21:07:03 **2** 1990s, and the early 2000s.
21:07:05 **3** Q. What were the sources from which talc was
21:07:08 **4** mined?
21:07:10 **5** A. The '60s up until about '67 or so would be
21:07:13 **6** from Italy; from there to approximately 2002, 2003,
21:07:21 **7** it would be from Vermont; and after that it's from
21:07:24 **8** China.
21:07:25 **9** Q. What were your findings regarding
21:07:27 **10** regulated asbestos fibers?
21:07:29 **11** A. Our results overall for 72 what I'll call
21:07:35 **12** historical containers that include 15 historical
21:07:38 **13** railroad car samples from Imerys, and out of that 72
21:07:44 **14** samples, 50 were positive for regulated asbestos, and
21:07:48 **15** that gives you a percentage of approximately
21:07:50 **16** 66 percent or so.
21:07:52 **17** If we break it down -- and, oh, that
21:07:54 **18** includes seven MDL samples that came from the Korean
21:08:00 **19** mine, or what we call the Asian talc.
21:08:04 **20** If we break it down for the Johnson's Baby
21:08:08 **21** Powder, we analyzed 34 historical samples with Asian.
21:08:13 **22** Out of that 34, 24 were positive, or 71 percent.
21:08:18 **23** We also analyzed 23 historical Shower to
21:08:21 **24** Shower containers that were Johnson & Johnson, and 18
21:08:25 **25** were positive, or 78 percent.
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21:08:28 **1** Of the 15 Imerys railroad car samples,
21:08:31 **2** eight were positive, or 53 percent.
21:08:36 **3** Excluding the seven Asian Johnson Baby
21:08:40 **4** Powder containers would give us 65 Johnson Baby
21:08:43 **5** Powder and STS and Imerys railroad car samples
21:08:47 **6** analyzed; 44 were positive, or 68 percent, for
21:08:49 **7** amphibole asbestos.
21:08:51 **8** And then we have a break -- then, of
21:08:53 **9** course, we have the breakdown of each of these
21:08:57 **10** without the Asian.
21:08:58 **11** Q. What were the results for fibrous talc?
21:09:04 **12** A. The qualitative analysis of fibrous
21:09:10 **13** talc -- let me just jump to the results section.
21:09:16 **14** Q. Page 9.
21:09:18 **15** A. Thank you. Been a long day.
21:09:21 **16** Q. Sure.
21:09:22 **17** A. Using the ISO PLM method, found that of
21:09:32 **18** the 56 Italian/Vermont/China source containers that
21:09:36 **19** we analyzed, 55, or 98 percent, contained fibrous
21:09:41 **20** talc. The Blount PLM method showed of the 72, 20
21:09:45 **21** contained fibrous talc.
21:09:47 **22** The TEM analysis showed that -- and I have
21:09:54 **23** that somewhere -- that there was similar
21:09:56 **24** concentration by the heavy density liquid method by
21:10:01 **25** TEM, which is biased against finding fibrous talc,
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21:10:06 **1** because unless it has iron in it, you'll have the
21:10:09 **2** same density as platy talc.
21:10:12 **3** So, really, the best predictor of fibrous
21:10:16 **4** talc would be the ISO PLM that does not use heavy
21:10:20 **5** density liquid, and most all the samples except for
21:10:23 **6** one that we tested had it in there.
21:10:42 **7** MS. O'DELL: Nothing further, Doctor.
21:10:43 **8** Thank you.
21:10:45 **9** THE WITNESS: Thank you.
21:10:47 **10** MR. CHACHKES: Nothing more here.
21:10:50 **11** FURTHER EXAMINATION
21:10:52 **12** BY MR. PROST:
21:10:52 **13** Q. Just one follow-up.
21:10:53 **14** You're talking about the results,
21:10:54 **15** Dr. Longo. Turn to page 6 of your report.
21:10:58 **16** You talk about how the analysis of 34
21:11:01 **17** historical Johnson's Baby Powder containers you
21:11:06 **18** determined were 71 percent positive.
21:11:09 **19** And then number 2, you say the analysis of
21:11:11 **20** 22 historical Shower to Shower, or 77 percent,
21:11:16 **21** positive; but the analysis of the Imerys 15 railroad
21:11:19 **22** car samples were only 53 percent positive.
21:11:23 **23** Do you have an explanation for the
21:11:28 **24** 25 percent difference there between the Imerys
21:11:31 **25** railroad car samples and the finished product
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21:11:34 **1** samples?
21:11:34 **2** **A. Yes, sir.**
21:11:36 **3** **Q.** What is that?
21:11:36 **4** **A. Only eight were positive out of the 15.**
21:11:40 **5** **Q.** Do you have an explanation for why there
21:11:43 **6** would be such a discrepancy in the positive findings
21:11:46 **7** using your methodology?
21:11:47 **8** MS. O'DELL: Object to the form.
21:11:48 **9** THE WITNESS: I don't look at it as a
21:11:49 **10** discrepancy. We call them like we see it. So
21:11:52 **11** if it's only eight out of the 15, that's all we
21:11:55 **12** saw.
21:11:57 **13** **Q.** (By Mr. Prost) And you expect that if the
21:11:58 **14** raw talc supplied had a certain percentage of
21:12:02 **15** asbestos, you would see the same percentage in the
21:12:04 **16** finished product?
21:12:05 **17** MS. O'DELL: Object to form.
21:12:07 **18** THE WITNESS: No, I wouldn't expect to see
21:12:09 **19** the same percentage, usually, because you're --
21:12:11 **20** flotation, you're using various methods. And we
21:12:16 **21** don't have a lot of data from the 1990s. So
21:12:23 **22** there may be, you know, a difference in the two.
21:12:26 **23** But we don't have enough data to make that yet,
21:12:29 **24** to make that jump on why one versus the other.
21:12:33 **25** **Q.** (By Mr. Prost) So your opinion as to what
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21:12:35 **1** could explain the difference is that there's a
21:12:38 **2** flotation method and it's a small sample size?
21:12:41 **3** **A. No. I never said that. I said there is a**
21:12:44 **4** **processing on it, but we don't have a lot of samples**
21:12:46 **5** **from 1990 and 2000. And, you know, we'll just have**
21:12:51 **6** **to see as we go forward with additional testing.**
21:12:55 **7** **Q.** So the smaller the sample size, the less
21:12:57 **8** reliable the findings, you would agree?
21:13:00 **9** **A. No --**
21:13:00 **10** MS. O'DELL: Object to form.
21:13:00 **11** THE WITNESS: I don't agree that the
21:13:02 **12** findings are not reliable at all. They are
21:13:03 **13** reliable. Why there's 53 percent versus some of
21:13:06 **14** the others, you know, hopefully we can answer
21:13:10 **15** this question some day. Or we get a larger
21:13:17 **16** sample size and see if there is actually a
21:13:17 **17** difference.
21:13:17 **18** MR. PROST: No further questions.
21:13:22 **19** MR. SILVER: Hold on. Yes, we do. We
21:13:23 **20** have one more. We can feed it to him or just
21 ask him.
22 THE WITNESS: Why don't you just go ahead
21:13:27 **23** and ask me.
24 / / /
25 / / /
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21:13:27 **1** EXAMINATION
21:13:27 **2** BY MR. SILVER:
21:13:27 **3** **Q.** Dr. Longo, in your report you characterize
21:13:29 **4** the Imerys samples as railcar samples. Where did you
21:13:32 **5** get that description from?
21:13:33 **6** **A. It was on the -- I believe it was right on**
21:13:36 **7** **the containers as well as from the MDL for the chain**
21:13:40 **8** **of custodies that they sent.**
21:13:42 **9** **Q.** And sitting here today, you believe that
21:13:43 **10** all those samples were actually railcar samples?
21:13:47 **11** MS. O'DELL: Object to the form.
21:13:48 **12** THE WITNESS: I don't know if they all
21:13:49 **13** were. We'd have to look at the chain of
21:13:51 **14** custodies. But I think there were one or two
21:13:53 **15** that said something different than railroad car
21:13:57 **16** samples, but I just characterized them all as
21:14:00 **17** railroad car samples.
21:14:01 **18** MR. SILVER: Thank you. No further
21:14:03 **19** questions.
21:14:09 **20** (Deposition concluded at 9:14 p.m.)
21 (Pursuant to Rule 30(e) of the Federal
22 Rules of Civil Procedure and/or O.C.G.A. 9-11-30(e),
23 signature of the witness has been waived.)
24 (Original transcript sent to Mr. Frost.)
25
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1 C E R T I F I C A T E
2
3 STATE OF GEORGIA:
4 COUNTY OF HALL:
5
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7 transcript was taken down, as stated in the
8 caption, and the questions and answers thereto
9 were reduced to typewriting under my direction;
10 that the foregoing pages 1 through 359 represent
11 a true, complete, and correct transcript of the
12 evidence given upon said hearing, and I further
13 certify that I am not of kin or counsel to the
14 parties in the case; am not in the regular
15 employ of counsel for any of said parties; nor
16 am I in anywise interested in the result of said
17 case.
18 This, the 7th day of February, 2019.
19
20 _____
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Georgia Certified Court Reporter

Exhibit F

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF NEW JERSEY

IN RE: JOHNSON & JOHNSON
TALCUM POWDER PRODUCTS
MARKETING SALES
PRACTICES, AND PRODUCTS
LIABILITY LITIGATION } MDL NO.16-2738 (FLW) (LHG)

VIDEO-RECORDED DEPOSITION OF
MARK W. RIGLER, PH.D.

February 6, 2019
9:14 a.m.

11340 Lakefield Drive
Suite 200
Johns Creek, Georgia

Frances Buono, RPR, CCR-B-791

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<p>1 INDEX TO EXAMINATIONS</p> <p>2</p> <p>3 <u>Examination</u> <u>Page</u></p> <p>4</p> <p>5 Examination by Mr. Chachkes 7</p> <p>6 Examination by Mr. Silver 214</p> <p>7 Examination by Ms. O'Dell 219</p> <p>8</p> <p>9 - - -</p> <p>10</p> <p>11</p> <p>12</p> <p>13</p> <p>14</p> <p>15</p> <p>16</p> <p>17</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p> <p>Atlanta Reporters, Inc. 866-344-0459 www.atlanta-reporters.com</p>	<p>1 (Reporter disclosure made pursuant to</p> <p>2 Article 10.B. of the Rules and Regulations of</p> <p>3 the Board of Court Reporting of the Judicial</p> <p>4 Council of Georgia.)</p> <p>5 (Identification statement by</p> <p>6 videographer.)</p> <p>7 MARK W. RIGLER, PH.D.,</p> <p>8 having been first duly sworn, was examined and</p> <p>09:13:39 9 testified as follows:</p> <p>09:13:39 10 EXAMINATION</p> <p>09:13:42 11 BY MR. CHACHKES:</p> <p>09:13:42 12 Q. Good morning, Dr. Rigler.</p> <p>09:14:52 13 A. Good morning.</p> <p>09:14:52 14 Q. How are you?</p> <p>09:14:52 15 A. Good; you?</p> <p>09:14:53 16 Q. Good.</p> <p>09:14:55 17 MR. CHACHKES: So just for the record, I</p> <p>09:14:55 18 have the same late production objections as</p> <p>09:14:58 19 yesterday and the same request to keep the</p> <p>09:15:01 20 deposition open. I assume you have the same?</p> <p>09:15:03 21 MS. O'DELL: We have the same opposition.</p> <p>09:15:06 22 Q. (By Mr. Chachkes) Okay. So what I've</p> <p>09:15:07 23 done is I've brought some exhibits from yesterday, so</p> <p>09:15:10 24 if you're wondering why there's stamps on them, it's</p> <p>09:15:14 25 because they're the stamps from Dr. Longo's</p> <p>Atlanta Reporters, Inc. 866-344-0459 www.atlanta-reporters.com</p>
<p>1 INDEX TO EXHIBITS</p> <p>2</p> <p>3 Defendants' <u>Exhibit</u> <u>Description</u> <u>Page</u></p> <p>4</p> <p>5 1 Invoices 204</p> <p>6 2 Excerpt - Trial transcript, 136</p> <p>7 February 20, 2018, Vol. XIV, Lanzo</p> <p>8 vs. Cyprus Amax</p> <p>9 3 MAS TEM Coefficient of Variation for 173</p> <p>10 Tremolite and Anthophyllite in Talc,</p> <p>11 A Quality Control Study, 9-6-18</p> <p>12 4 Graph 177</p> <p>13</p> <p>14 (Original Exhibits 1 through 4 have been</p> <p>15 attached to the original transcript.)</p> <p>16</p> <p>17 - - -</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p> <p>Atlanta Reporters, Inc. 866-344-0459 www.atlanta-reporters.com</p>	<p>09:15:17 1 deposition. We are going to use some of the same</p> <p>09:15:19 2 exhibits, if that's okay.</p> <p>09:15:20 3 A. Yes.</p> <p>09:15:20 4 Q. So what's been marked yesterday -- so all</p> <p>09:15:22 5 the stamps are February 5, 2019, Longo. And I'm</p> <p>09:15:28 6 going to use those exhibits unless I use a new</p> <p>09:15:31 7 exhibit.</p> <p>09:15:31 8 A. Okay.</p> <p>09:15:32 9 Q. So I'm just going to hand you what's been</p> <p>09:15:33 10 marked yesterday as Exhibit 2. And you recognize</p> <p>09:15:36 11 that as the January 15 version of the report that you</p> <p>09:15:40 12 cosigned?</p> <p>09:15:41 13 A. Yes.</p> <p>09:15:41 14 Q. Okay. And what was your involvement in</p> <p>09:15:44 15 drafting this report?</p> <p>09:15:46 16 A. I reviewed the report, looked over the</p> <p>09:15:50 17 data, and made typographical and grammatical</p> <p>09:15:55 18 corrections throughout the report.</p> <p>09:15:57 19 Q. Okay. Do you feel qualified to testify to</p> <p>09:16:05 20 every matter that's in that report?</p> <p>09:16:07 21 MS. O'DELL: Object to the form.</p> <p>09:16:08 22 THE WITNESS: As I say, I am qualified to</p> <p>09:16:12 23 testify on what's in this report now, yes.</p> <p>09:16:14 24 Q. (By Mr. Chachkes) Okay. So if Dr. Longo</p> <p>09:16:17 25 were to, for example, not show up at a trial, you</p> <p>Atlanta Reporters, Inc. 866-344-0459 www.atlanta-reporters.com</p>

09:16:20 **1** could testify to everything that you could testify
09:16:21 **2** to?
09:16:22 **3 A. Well, I'm not Dr. Longo, of course.**
09:16:26 **4 However, I can testify as to what's in this report,**
09:16:29 **5 yes.**
09:16:29 **6 Q. Okay. To what degree is Dr. Longo more**
09:16:33 **7 qualified about something in that report than you?**
09:16:36 **8 A. Dr. Longo has a degree in materials**
09:16:39 **9 science, and my degree is in microbiology, my Ph.D.**
09:16:44 **10 So he has more experience in the materials area, so I**
09:16:53 **11 would, you know, defer to him on those topics.**
09:16:57 **12 Q. Okay. Well, there's no microbiology in**
09:17:01 **13 the report; right?**
09:17:02 **14 A. Not that I know of, no. But there are**
09:17:04 **15 microscopic things in the report, and that's one of**
09:17:07 **16 my areas of qualification, electron microscopy and**
09:17:12 **17 the microscopic world, if you will.**
09:17:14 **18 Q. So that's sort of a comparison of your**
09:17:16 **19 relative expertise. What about your relative ability**
09:17:19 **20 to talk about substantive matters, data, you know,**
09:17:23 **21 what analysts did? Is there any difference there**
09:17:26 **22 between you and Dr. Longo?**
09:17:27 **23 A. Well, Dr. Longo is the head of the**
09:17:31 **24 laboratory, so I would defer to him on a number of**
09:17:35 **25 those areas, and specific areas.**
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09:17:38 **1 Q. Okay. For example?**
09:17:39 **2 A. Well, for example, there may be some**
09:17:42 **3 situations where he directed the study and that**
09:17:49 **4 would -- I would defer those things to him.**
09:17:51 **5 Q. Did you direct any of the studies in that**
09:17:54 **6 report?**
09:17:54 **7 A. As far as me directing the studies in**
09:17:57 **8 here, that was mainly Dr. Longo.**
09:17:58 **9 Q. Okay. What studies in there did you**
09:18:02 **10 direct?**
09:18:03 **11 A. Again, they were mainly directed by**
09:18:06 **12 Dr. Longo.**
09:18:06 **13 Q. You say mainly. I'm just wondering is**
09:18:09 **14 there anything left over that you directed?**
09:18:11 **15 MS. O'DELL: Object to the form.**
09:18:12 **16 THE WITNESS: In terms of the study**
09:18:16 **17 process, originally we conferred on it in the**
09:18:20 **18 very beginning, but Dr. Longo was the one who**
09:18:24 **19 mainly carried out the processes and direction**
09:18:28 **20 of the studies.**
09:18:29 **21 Q. (By Mr. Chachkes) Okay. So the**
09:18:31 **22 conceptualization of the experimental procedures you**
09:18:35 **23 participated, but in the actual execution you did not**
09:18:38 **24 participate?**
09:18:39 **25 MS. O'DELL: Object to the form.**
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09:18:40 **1 THE WITNESS: Well, in terms of looking at**
09:18:42 **2 data, quality control issues, that type of**
09:18:45 **3 thing, which would be part of the study, I would**
09:18:47 **4 say, yes, I was part of that.**
09:18:49 **5 Q. (By Mr. Chachkes) Okay. So the actual**
09:18:51 **6 experimentation process, the -- people call it wet**
09:18:54 **7 work; are you familiar with that?**
09:18:55 **8 A. Yes.**
09:18:56 **9 Q. Okay. So the actual experimental process**
09:18:58 **10 and the wet work, you did not participate in that?**
09:19:01 **11 A. Again, Dr. Longo directed those activities**
09:19:06 **12 in this study; and again, I will defer those things**
09:19:10 **13 to him, you know, if -- once we get to those topics**
09:19:14 **14 and we talk about those topics, because right now**
09:19:17 **15 we're talking about things in general.**
09:19:18 **16 Q. I'm not asking about Dr. Longo. I'm**
09:19:20 **17 asking about you.**
09:19:20 **18 A. Sure.**
09:19:21 **19 Q. What in the report -- which experiments**
09:19:23 **20 did you participate in, if any?**
09:19:24 **21 A. I told you in the beginning what I did**
09:19:28 **22 here, which was mainly review the data, review the**
09:19:31 **23 report for typographical or grammatical errors, also**
09:19:36 **24 checking data, that type of thing.**
09:19:38 **25 Q. So can you confirm you did not participate**
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09:19:41 **1 in the actual experimenting that's reported on in the**
09:19:44 **2 exhibit?**
09:19:44 **3 MS. O'DELL: Object to the form.**
09:19:47 **4 THE WITNESS: Again, I was part of the**
09:19:48 **5 study working on part of the study, so I**
09:19:50 **6 consider myself as someone who participated in**
09:19:53 **7 the study.**
09:19:53 **8 Q. (By Mr. Chachkes) Okay. So --**
09:19:55 **9 A. That's the way it works in the laboratory.**
09:19:57 **10 Q. Let's be more specific.**
09:19:58 **11 A. Sure.**
09:19:59 **12 Q. So you understand what an experiment is;**
09:20:04 **13 right?**
09:20:04 **14 MS. O'DELL: In what context?**
09:20:07 **15 THE WITNESS: Yeah, in what context?**
09:20:08 **16 Q. (By Mr. Chachkes) Okay. So you're**
09:20:09 **17 unclear on what an experiment is?**
09:20:11 **18 A. No, I'm not unclear on what an experiment**
09:20:13 **19 is. I'm wondering what you're asking as far as your**
09:20:15 **20 question.**
09:20:15 **21 Q. What does the word experiment mean to you?**
09:20:17 **22 A. Well, it would be a set of tests after**
09:20:21 **23 coming up with a hypothesis about a particular**
09:20:23 **24 situation what the questions are.**
09:20:25 **25 Q. Let's use your definition. Were you**
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09:20:26 **1** involved in any experiments where you were actually
09:20:29 **2** testing -- testing -- J&J bottles of talc?
09:20:35 **3** **A. I was not -- I was not handling and**
09:20:39 **4 testing the talc myself. Our analysts in the**
09:20:42 **5 laboratory were directed to do that.**
09:20:44 **6** **Q.** Did you ever use a PLM for the purposes of
09:20:48 **7** this report?
09:20:49 **8** **A. No, I did not.**
09:20:50 **9** **Q.** Did you ever use a TEM for the purposes of
09:20:52 **10** this report?
09:20:53 **11** **A. Not for the purposes of this report.**
09:20:55 **12** **Q.** Did you ever use an XRD device for the
09:20:59 **13** purposes of this report?
09:21:01 **14** **A. We do not have the XRD device or that type**
09:21:04 **15 of device at our laboratory.**
09:21:06 **16** **Q.** Did you ever do an SAED experiment for the
09:21:08 **17** purposes of this report?
09:21:10 **18** **A. Again, same answer as with the TEM.**
09:21:13 **19** **Q.** So that's a no?
09:21:15 **20** **A. Correct.**
09:21:16 **21** **Q.** Okay. And did you ever do EDXA work
09:21:21 **22** experiments on J&J bottles of talc for this report?
09:21:24 **23** **A. That would be the same answer.**
09:21:26 **24** **Q.** Which is a no?
09:21:26 **25** **A. Yes.**

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09:22:48 **1** done, you had the data?
09:22:49 **2** **A. Well, then I would review the data, go**
09:22:54 **3 through the data, and then see again if it met the QC**
09:22:59 **4 qualifications.**
09:23:01 **5** **Q.** Okay. Anything else that you did once the
09:23:03 **6** data was done?
09:23:04 **7** **A. Not that I can recall as I sit here.**
09:23:09 **8** **Q.** Okay. During any of the experiments did
09:23:13 **9** you sit over the shoulder of any analyst and watch
09:23:17 **10** the work they were doing?
09:23:18 **11** **A. Yeah. I'm at the laboratory mostly on a**
09:23:23 **12 daily basis, so I was able to go in and look and see**
09:23:25 **13 what analysts were doing at any particular time.**
09:23:28 **14** **Q.** Okay. Were you substantively contributing
09:23:33 **15** at those moments when you were looking at what
09:23:35 **16** analysts were doing?
09:23:36 **17** **A. What do you mean by that?**
09:23:37 **18** **Q.** Well, were you telling them to change
09:23:41 **19** their behavior or to do something that they weren't
09:23:43 **20** otherwise going to do? Anything that affected their
09:23:46 **21** experimental work?
09:23:47 **22** MS. O'DELL: Object to the form.
09:23:48 **23** THE WITNESS: No. No.
09:23:48 **24** **Q.** (By Mr. Chachkes) And so you're an
09:23:52 **25** employee of MAS?

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09:21:27 **1** **Q.** And did you -- let's -- so once the
09:21:36 **2** experiments were done and you saw the data, did you
09:21:39 **3** do any substantive contribution to the report other
09:21:46 **4** than correct typos?
09:21:47 **5** MS. O'DELL: Object to the form.
09:21:48 **6** THE WITNESS: In terms of looking at what
09:21:50 **7** was done during the study and working with the
09:21:55 **8** TEM manager on the study and the quality
09:21:59 **9** control, yes.
09:22:00 **10** **Q.** (By Mr. Chachkes) Okay. So can you be
09:22:02 **11** more specific? So you did quality control. What's
09:22:04 **12** that?
09:22:04 **13** **A. Well, I monitored the reporting that was**
09:22:08 **14 done in terms of what samples were analyzed, what**
09:22:12 **15 replicates, duplicates, and blanks that would be**
09:22:16 **16 tested in terms of what were necessary for us to meet**
09:22:20 **17 the QC standards.**
09:22:22 **18** **Q.** Okay. And who set the QC standards?
09:22:25 **19** **A. Well, the QC standards are set by NVLAP**
09:22:30 **20 NIST, the National Institutes of Standard and**
09:22:34 **21 Technology, for TEM labs that are analyzing for**
09:22:36 **22 asbestos.**
09:22:36 **23** **Q.** Other than ensure that folks complied with
09:22:42 **24** the QC standards, what did you do?
09:22:46 **25** So let's say after the experiments were

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09:23:53 **1** **A. Yes.**
09:23:53 **2** **Q.** How long have you been an employee there?
09:23:55 **3** **A. Over 30 years.**
09:23:57 **4** **Q.** Let's go back to the report. Are there
09:24:04 **5** any sections of the report that you can say you
09:24:06 **6** didn't work on?
09:24:08 **7** MS. O'DELL: Object to the form.
09:24:09 **8** THE WITNESS: I would have to look. If
09:24:14 **9** you're talking about the reports in front of me
09:24:16 **10** here --
09:24:17 **11** **Q.** (By Mr. Chachkes) Yes, the January 15
09:24:19 **12** expert report for the MDL.
09:24:20 **13** **A. The J3 portions of the report.**
09:24:24 **14** **Q.** And you would say you had some involvement
09:24:26 **15** in all other portions?
09:24:28 **16** **A. In other portions, yes.**
09:24:29 **17** **Q.** How much time did you devote to the work
09:24:32 **18** underlying this report and the report itself?
09:24:34 **19** **A. I didn't keep track of it. I have no**
09:24:39 **20** **idea.**
09:24:39 **21** **Q.** Over 10 hours?
09:24:41 **22** **A. Probably over 10 hours.**
09:24:42 **23** **Q.** Over 20 hours?
09:24:43 **24** **A. Again, that would be a guesstimate. I**
09:24:45 **25** **don't know beyond that.**

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09:24:47 **1** Q. More than 15 hours?
09:24:48 **2** A. **I don't know.**
09:24:49 **3** Q. So probably over 10 hours, but you don't
09:24:52 **4** know beyond that?
09:24:52 **5** A. **Correct.**
09:24:53 **6** Q. Okay. And were you involved in the
09:24:58 **7** creation of the protocols to test J&J talc in this
09:25:03 **8** case?
09:25:04 **9** A. **In terms of the protocols for the testing,**
09:25:09 **10** **we used standard methods throughout for the analysis.**
09:25:14 **11** **Dr. Longo essentially put together the way the test**
09:25:18 **12** **or the study was going to be done, but we, you know,**
09:25:21 **13** **overall use the standard methods throughout.**
09:25:23 **14** Q. When you say Dr. Longo put together the
09:25:26 **15** way -- you said the way the studies would be
09:25:28 **16** conducted?
09:25:29 **17** A. **Yes.**
09:25:29 **18** Q. Was that something in writing?
09:25:31 **19** A. **Well, he directs the study on a daily**
09:25:35 **20** **basis.**
09:25:35 **21** Q. The question is was it in writing?
09:25:38 **22** A. **Was it in writing? I don't know. You'd**
09:25:42 **23** **have to ask Dr. Longo.**
09:25:43 **24** Q. Okay. So you're unaware of whether he
09:25:46 **25** communicated with the analysts about protocol in
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09:25:48 **1** writing?
09:25:49 **2** A. **Well, the --**
09:25:50 **3** MS. O'DELL: Object to form.
09:25:51 **4** THE WITNESS: -- laboratory has protocol
09:25:52 **5** for the way that talc is analyzed and
09:25:59 **6** asbestos-bearing products are analyzed, so we
09:26:01 **7** have written protocol for those things.
09:26:03 **8** MR. CHACHKES: Okay. And I think I've
09:26:06 **9** requested that those be produced. I don't think
09:26:07 **10** those have been produced.
09:26:09 **11** MS. O'DELL: I think it's reflected in his
09:26:11 **12** report, but we will consider your request.
09:26:13 **13** Q. (By Mr. Chachkes) Okay. Do you
09:26:21 **14** communicate with the analysts by email at all?
09:26:23 **15** A. **Communicate with the analysts by email?**
09:26:26 **16** **No. I can go speak to them.**
09:26:29 **17** Q. Okay. There's no sort of like weekly
09:26:33 **18** email or monthly email where you summarize what's
09:26:36 **19** going on?
09:26:37 **20** A. **No.**
09:26:37 **21** Q. Did you ever change an analyst's
09:26:42 **22** determinations where an analyst came up with some
09:26:44 **23** conclusion and you said maybe that's not right, go
09:26:46 **24** back?
09:26:47 **25** A. **No.**
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09:26:49 **1** Q. Do you consider yourself an expert in TEM
09:26:56 **2** analysis?
09:26:56 **3** A. **Well, the term expert, I think, you**
09:27:00 **4** **probably have to defer that to the court. I mean, I**
09:27:04 **5** **have more than the layperson's knowledge so -- but I**
09:27:08 **6** **would defer that to the court.**
09:27:10 **7** Q. Okay. Have you --
09:27:13 **8** A. **I mean, I've been qualified as an expert**
09:27:16 **9** **before, but in this case...**
09:27:19 **10** Q. When is the first time you ever used a
09:27:21 **11** TEM?
09:27:21 **12** A. **The first time I used a TEM? Let's see.**
09:27:24 **13** **That would probably have been sometime in the early**
09:27:29 **14** **'80s, I would say, yeah.**
09:27:31 **15** Q. How many times have you used an SAED to
09:27:35 **16** characterize a particle?
09:27:36 **17** A. **SAED?**
09:27:37 **18** Q. SAED.
09:27:39 **19** A. **I don't know if I could count the number**
09:27:40 **20** **of times.**
09:27:41 **21** Q. How many times have you used EDXA to
09:27:45 **22** characterize a particle?
09:27:47 **23** A. **Same answer on that. Yes.**
09:27:48 **24** Q. What about PLM, do you consider yourself
09:27:53 **25** an expert on PLM?
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09:27:54 **1** A. **I am not a PLM microscopist.**
09:27:56 **2** Q. Okay. What was your contribution to the
09:27:58 **3** PLM aspects of the January 15 report?
09:28:03 **4** A. **Well, as far as PLM contributions, again,**
09:28:07 **5** **I'm not the PLM analyst, so we just wanted to be sure**
09:28:13 **6** **that the quality program was being followed in the**
09:28:18 **7** **laboratory.**
09:28:18 **8** Q. When you say that a quality program was
09:28:21 **9** being followed, is that the same contribution you
09:28:31 **10** made to the other portions of the report?
09:28:33 **11** MS. O'DELL: Object to form.
09:28:34 **12** THE WITNESS: Yes. Well, I would say yes
09:28:35 **13** to that. Yes.
09:28:36 **14** Q. (By Mr. Chachkes) Okay. Did you ever
09:28:43 **15** personally test a talc sample for asbestos
09:28:45 **16** contamination?
09:28:46 **17** A. **Did I ever personally test them?**
09:28:48 **18** Q. Yes.
09:28:48 **19** A. **Not that I can recall as I sit here.**
09:28:50 **20** Q. Okay.
09:28:55 **21** A. **We've done tissue testing for talc and**
09:29:00 **22** **asbestos in tissue, yes.**
09:29:01 **23** Q. But just testing talcum powder that came
09:29:05 **24** out of a bottle, you've never done that?
09:29:07 **25** A. **I've not personally tested that.**
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09:29:09 **1** Q. You have an undergraduate degree in
09:29:21 **2** biology?
09:29:21 **3** A. Yes.
09:29:21 **4** Q. And a Ph.D. in microbiology?
09:29:24 **5** A. Yes.
09:29:24 **6** Q. Did you take any geology courses at any
09:29:27 **7** point in your education?
09:29:27 **8** A. No, but at the University of Georgia one
09:29:31 **9** of my very good friends in graduate school was a
09:29:34 **10** geologist, and we discussed a lot of issues
09:29:38 **11** surrounding the phyllosilicates. He was a kaolin
09:29:44 **12** person. He was a clay person.
09:29:44 **13** In Georgia we have a lot of red clay, and
09:29:46 **14** so that was one of his areas that he enjoyed, and I
09:29:51 **15** learned quite a bit from him. Very strong geology
09:29:56 **16** department at the University of Georgia.
09:29:57 **17** Q. Other than talking to a friend about
09:29:59 **18** geology, do you have any formal geology education?
09:30:03 **19** MS. O'DELL: Object to form.
09:30:04 **20** THE WITNESS: No.
09:30:04 **21** Q. (By Mr. Chachkes) Did you take any
09:30:06 **22** mineralogy courses during any part of your
09:30:07 **23** educations?
09:30:07 **24** A. It's interesting because in the electron
09:30:11 **25** microscopy courses that you take, the substances that
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09:30:17 **1** we analyzed, you know, varied from biological
09:30:20 **2** substances to mineralogical substances. So you would
09:30:24 **3** get a portion of that with that training, and I got
09:30:27 **4** some of that.
09:30:28 **5** Q. Okay. Have you ever physically analyzed a
09:30:33 **6** mineral under a microscopy technique?
09:30:36 **7** A. I, again, think the answer to that is I
09:30:41 **8** have sat with the analysts, that includes the PLM
09:30:46 **9** analysts, watched them do the work, and participated
09:30:51 **10** that way in terms of the -- that kind of an analysis.
09:30:55 **11** Q. Other than watching other people analyze
09:30:57 **12** minerals under microscopy techniques, have you any
09:31:01 **13** experience analyzing minerals under microscopy
09:31:03 **14** techniques?
09:31:03 **15** A. Well, by electron microscopy in terms of
09:31:09 **16** seeing these minerals and having run into them during
09:31:13 **17** an analysis. And again, I've been doing electron
09:31:17 **18** microscopy since the '80s, so the tissue analysis
09:31:21 **19** that I've done in the past we've come across, you
09:31:26 **20** know, mineral types and there's tissues and how to
09:31:28 **21** analyze those. So I've done that in tissue samples
09:31:32 **22** at the optical or the bulk PLM level very limited,
09:31:37 **23** say.
09:31:37 **24** Q. Okay. Have you ever personally run a
09:31:39 **25** microscopy analysis of minerals that aren't in
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09:31:44 **1** tissue?
09:31:45 **2** A. Yes.
09:31:48 **3** Q. Can you explain?
09:31:49 **4** A. Again, at MAS I've had a variety of roles
09:31:55 **5** from the early '90s when I was hired there; and MAS
09:32:02 **6** is a materials characterization laboratory, so I
09:32:06 **7** worked on hundreds of different kinds of projects
09:32:09 **8** using microscopy and gas chromatography, all kinds of
09:32:15 **9** chemical techniques.
09:32:16 **10** So I have run into situations where I've
09:32:18 **11** examined minerals that have been in materials such as
09:32:22 **12** plastics or polymers, for instance, where we have
09:32:25 **13** done cutting or thin sectioning of that kind of
09:32:29 **14** material, and you would look at the inclusions in the
09:32:32 **15** polymers because they are -- they're additives, they
09:32:36 **16** may be for a variety of different reasons, and then
09:32:39 **17** you end up analyzing them or seeing them. And this
09:32:43 **18** was mostly by SEM or TEM.
09:32:46 **19** Q. And you personally did those experiments?
09:32:48 **20** A. Yes, I've personally done those things.
09:32:50 **21** Q. Have you ever personally done a microscopy
09:32:52 **22** investigation of a mineral or a solid solution that's
09:32:56 **23** just mineral or solid solution?
09:32:59 **24** A. Can you explain a bit more?
09:33:01 **25** Q. Do you know what a solid solution is?
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09:33:03 **1** A. Yes.
09:33:03 **2** Q. So, for example, a bottle of talc just
09:33:06 **3** contains minerals; right?
09:33:08 **4** A. Yes.
09:33:08 **5** Q. Okay. So have you ever --
09:33:09 **6** MS. O'DELL: Object to the form.
09:33:10 **7** Q. (By Mr. Chachkes) -- personally done a
09:33:12 **8** microscopy analysis of something that just contains
09:33:15 **9** minerals, doesn't contain anything else like plastics
09:33:18 **10** or other things?
09:33:19 **11** A. Well, I think if you look at it from the
09:33:23 **12** viewpoint of if you have a plastic or whatever it may
09:33:29 **13** be and a mineral inclusion in there, you're looking
09:33:31 **14** at the mineral, you know, aside from the other
09:33:33 **15** polymeric material that's there. So the answer to
09:33:36 **16** that is yes. And as far as a solid solution series
09:33:39 **17** mineral, yes.
09:33:40 **18** Q. Okay. I want to be clear what you're
09:33:42 **19** answering because you've talked about plastics, and
09:33:44 **20** my question was saying expressly exclude those. So
09:33:47 **21** let me ask it again just to make sure I have a clear
09:33:50 **22** answer.
09:33:50 **23** A. All right.
09:33:50 **24** Q. Have you ever personally done a microscopy
09:33:53 **25** analysis of minerals and only minerals, where it's
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09:33:57 **1** just minerals you're looking at?
09:33:58 **2 A. The answer to that is yes.**
09:34:00 **3 Q. Okay. Can you give me an example?**
09:34:02 **4 A. Again, I will go back to studies that**
09:34:06 **5 we've done on client samples over the years, most of**
09:34:10 **6 them being particulate types of samples. In the**
09:34:13 **7 early days when I came to MAS, we were looking at a**
09:34:16 **8 lot of asbestos-bearing materials. So part of my**
09:34:21 **9 training at the company was looking at those**
09:34:24 **10 materials by SEM or TEM.**
09:34:26 **11 Q. Okay. So those asbestos-bearing materials**
09:34:28 **12 were only minerals, the -- you say asbestos-bearing,**
09:34:32 **13 but the thing that was bearing them was minerals?**
09:34:34 **14 A. Yeah. I mean, if you're looking at**
09:34:36 **15 something like vermiculite, you know, pure -- yeah.**
09:34:39 **16 Q. Got it. Did you take any crystallography**
09:34:43 **17 courses during your education?**
09:34:44 **18 A. Once again, that's part of the TEM**
09:34:47 **19 training that I got.**
09:34:48 **20 Q. Okay. Was the TEM training you got, that**
09:34:50 **21 was, I'm sorry, in college?**
09:34:52 **22 A. Yeah, in graduate school.**
09:34:53 **23 Q. Graduate school. Was that a particular**
09:34:55 **24 course, or was that just part of your thesis work?**
09:34:58 **25 A. No, that's a course. They had courses in**
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09:35:01 **1 scanning electron microscopy and transmission**
09:35:04 **2 electron microscopy, and those were all part of the**
09:35:06 **3 course that you took. You had to learn about**
09:35:11 **4 electron optics; you had to learn about how electrons**
09:35:14 **5 interact with materials. So that would all be part**
09:35:18 **6 of my training.**
09:35:19 **7 Q. Okay. You're not a geologist?**
09:35:21 **8 A. That's correct.**
09:35:22 **9 Q. You're not a mineralogist?**
09:35:24 **10 A. No.**
09:35:24 **11 Q. Okay. You're not a crystallographer?**
09:35:28 **12 A. Well, I know crystallography. But as far**
09:35:31 **13 as being a, quote, crystallographer, if there is such**
09:35:35 **14 a person that just specializes in that, the answer is**
09:35:37 **15 no.**
09:35:37 **16 Q. You're not a certified industrial**
09:35:39 **17 hygienist?**
09:35:39 **18 A. Correct.**
09:35:39 **19 Q. You have done exposure assessments;**
09:35:42 **20 correct?**
09:35:42 **21 A. Yes.**
09:35:42 **22 Q. Okay. Have you done exposure studies?**
09:35:46 **23 A. The answer to that is I have been involved**
09:35:49 **24 in exposure studies, yes.**
09:35:51 **25 Q. Okay. You're not a pathologist?**
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09:35:56 **1 A. No, I'm not a medical doctor.**
09:35:57 **2 Q. Okay. You don't have any medical**
09:35:59 **3 training?**
09:36:00 **4 A. Well, the medical training I have is**
09:36:03 **5 related to my training as a -- in undergraduate as a**
09:36:09 **6 biologist. The curriculum that I took at Villanova**
09:36:15 **7 was for premed, and that included courses that**
09:36:18 **8 doctors would take prior to medical school, things**
09:36:21 **9 like histotechnique, which is the study of how you**
09:36:26 **10 prepare tissues, how to prepare and section those**
09:36:29 **11 tissues. Also, you know, you would -- I took**
09:36:33 **12 comparative anatomy. I taught anatomy at Emory**
09:36:38 **13 University for a semester down here in Atlanta.**
09:36:42 **14 So I have training in a number of areas**
09:36:45 **15 that doctors would have, all the way from neurology**
09:36:49 **16 to pathology, that type of thing.**
09:36:50 **17 Q. You're not a statistician?**
09:36:52 **18 A. No. But we use statistics in our work.**
09:36:55 **19 Q. Okay. You're not a geostatistician?**
09:36:58 **20 A. No.**
09:36:58 **21 Q. Have you ever created a method for**
09:37:10 **22 microscopy investigation that has been published in a**
09:37:15 **23 peer-reviewed publication?**
09:37:15 **24 A. Yes.**
09:37:16 **25 Q. Can you give me an example?**
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09:37:18 **1 A. I would say we did a study a number of**
09:37:24 **2 years ago on the famous Kent Micronite filter. It**
09:37:31 **3 was a blue filter that was with -- made by Lorillard**
09:37:36 **4 and they put that on cigarettes to essentially be a**
09:37:40 **5 filtration device. So that was one that I did.**
09:37:44 **6 Q. Okay.**
09:37:45 **7 A. And that was published.**
09:37:46 **8 Q. Okay. And that was a methodology for**
09:37:48 **9 investigating the subject matter?**
09:37:50 **10 A. Yes.**
09:37:50 **11 Q. Okay. What about methodologies for**
09:37:57 **12 looking for asbestos in talc?**
09:38:03 **13 A. As far as methodologies for looking for**
09:38:05 **14 asbestos in talc, the answer to that is yes.**
09:38:07 **15 Q. Okay. So you've published in the**
09:38:08 **16 peer-reviewed --**
09:38:09 **17 A. Oh, I'm sorry, published. No. Not yet.**
09:38:11 **18 Q. Okay. Are you working on something?**
09:38:13 **19 A. Well, I can't confirm or deny that right**
09:38:16 **20 now.**
09:38:16 **21 Q. Well, it's a deposition. You have to.**
09:38:18 **22 A. Well, I can --**
09:38:19 **23 Q. Are you working on something right now?**
09:38:21 **24 A. Our experience with publications is that**
09:38:26 **25 we don't talk about those things because in the past**
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09:38:30 **1** we were working on a publication and somehow, some
09:38:35 **2** way, some attorney groups got hold of it, and they
09:38:39 **3** influenced the editor on that document. So we don't
09:38:43 **4** talk about those things anymore.
09:38:45 **5** Q. Okay. So pending question is: Are you
09:38:48 **6** working on a publication about finding talc in
09:38:52 **7** asbestos, and you are refusing to answer?
09:38:54 **8** MS. O'DELL: Object to the form.
09:38:55 **9** THE WITNESS: No.
09:38:55 **10** MS. O'DELL: That's not what he said.
09:38:56 **11** Q. (By Mr. Chachkes) Okay. So are you
09:38:57 **12** working on a publication about finding talc in
09:38:59 **13** asbestos?
09:39:00 **14** A. No.
09:39:00 **15** MS. O'DELL: Object to the form.
09:39:01 **16** Q. (By Mr. Chachkes) I'm sorry. Are you
09:39:02 **17** working on a publication about finding asbestos in
09:39:04 **18** talc?
09:39:04 **19** MS. O'DELL: Object to the form.
09:39:05 **20** THE WITNESS: I answered the question
09:39:07 **21** twice.
09:39:07 **22** Q. (By Mr. Chachkes) The answer is yes?
09:39:09 **23** A. I just answered the question twice. I
09:39:11 **24** said no.
09:39:11 **25** Q. Okay. All right. Are you working on any
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09:39:18 **1** publications about talc that you hope to get into the
09:39:20 **2** peer-reviewed literature?
09:39:21 **3** MS. O'DELL: Object to the form.
09:39:22 **4** THE WITNESS: I've already answered that
09:39:25 **5** question before, and I can neither confirm nor
09:39:31 **6** deny that right now.
09:39:31 **7** Q. (By Mr. Chachkes) Okay. I'll give you
09:39:32 **8** one more chance. If you would answer the question
09:39:35 **9** are you working on any publications about talc that
09:39:37 **10** you intend to put in the peer-reviewed literature,
09:39:39 **11** and you're refusing to answer?
09:39:40 **12** A. No, I'm not --
09:39:41 **13** MS. O'DELL: Object to the form.
09:39:43 **14** THE WITNESS: I'm not refusing to answer.
09:39:45 **15** I've already answered.
09:39:45 **16** Q. (By Mr. Chachkes) Your answer is you can
09:39:47 **17** neither confirm nor deny?
18 A. Correct.
19 Q. And that's different from a refusal to
20 answer?
09:39:49 **21** MS. O'DELL: Yes.
09:39:50 **22** THE WITNESS: No, that's an answer.
09:39:51 **23** MR. CHACHKES: Okay. And so, Counsel,
09:39:51 **24** that's your position, you're going to not allow
09:39:54 **25** that question?
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09:39:55 **1** MS. O'DELL: The question was asked, and
09:39:57 **2** the witness answered it.
09:39:58 **3** MR. CHACHKES: Okay.
09:40:00 **4** MR. SILVER: Please note that Imerys will
5 be --
6 THE REPORTER: I'm sorry, I can't hear
7 you.
09:40:07 **8** MR SILVER: Imerys will be calling the
09:40:07 **9** Special Master at the break to have the witness
09:40:09 **10** compelled to answer the question, but we will
09:40:13 **11** wait for a break now.
09:40:14 **12** Q. (By Mr. Chachkes) Okay. Has any
09:40:15 **13** governmental body asked you to test talc?
09:40:19 **14** A. Not that I know of, no.
09:40:20 **15** Q. Has any School of Public Health asked you
09:40:22 **16** to test talc?
09:40:23 **17** A. School of Public Health, no.
09:40:25 **18** Q. Have you ever taught any courses to train
09:40:27 **19** microscopists?
09:40:30 **20** A. The answer to that is yes, I've been part
09:40:33 **21** of some seminars for training.
09:40:38 **22** Q. What seminars?
09:40:42 **23** A. A number of years ago at the American
09:40:46 **24** Industrial Hygiene Conference there was a session on
09:40:48 **25** electron microscopy of asbestos-bearing materials and
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09:40:52 **1** I had a session in that.
09:40:53 **2** Q. And you taught microscopy techniques to
09:40:57 **3** the participants?
09:40:57 **4** A. Yes.
09:40:58 **5** Q. Have you ever attended a McCrone training
09:41:05 **6** or testing class?
09:41:06 **7** A. The answer to that is yes.
09:41:07 **8** Q. Can you tell me when?
09:41:08 **9** A. The one that I -- wait a minute. Let me
09:41:11 **10** see if that was McCrone. I think that was -- that
09:41:17 **11** was a different group for training for mold spore
09:41:21 **12** analysis.
09:41:22 **13** Q. Okay. So you've tested -- you've tested a
09:41:24 **14** McCrone class for mold spore analysis?
09:41:27 **15** A. No. It was another group.
09:41:28 **16** Q. Okay. Have you ever attended a McCrone
09:41:31 **17** testing or training class?
09:41:32 **18** A. Yes.
09:41:32 **19** Q. For asbestos?
09:41:33 **20** A. No. The one that we had, I believe at our
09:41:37 **21** laboratory, we had them come in. Again, it was for
09:41:39 **22** mold analysis, mold spore analysis.
09:41:42 **23** Q. Any other McCrone testing or training
09:41:44 **24** class that you have attended?
09:41:46 **25** A. Not that I can recall as I sit here.
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09:41:48 **1 Q.** Okay. Were you consulted by the FDA in
09:41:53 **2** their recent testing of talc?
09:41:54 **3 A. No.**
09:41:55 **4 Q.** Have you been consulted by any foreign
09:41:59 **5** bodies about testing of talc?
09:42:01 **6** MS. O'DELL: Object to the form.
09:42:02 **7 Q.** (By Mr. Chachkes) Foreign countries?
09:42:04 **8 A. No.**
09:42:05 **9 Q.** Has any third-party consulted with you
09:42:14 **10** about the testing of talc that isn't someone who's
09:42:17 **11** paying you?
09:42:18 **12** MS. O'DELL: Object to the form.
09:42:21 **13** THE WITNESS: Ask the question again.
09:42:22 **14 Q.** (By Mr. Chachkes) Has any third-party --
09:42:23 **15** has anybody asked you at MAS to consult about testing
09:42:26 **16** of talc that isn't paying you?
09:42:28 **17** MS. O'DELL: Object to the form.
09:42:29 **18** THE WITNESS: Not that I know of. You
09:42:31 **19** would have to ask Dr. Longo about that.
09:42:33 **20 Q.** (By Mr. Chachkes) Is all the talc testing
09:42:36 **21** that you've been involved with been done at the
09:42:38 **22** request of plaintiffs' lawyers who pay you?
09:42:40 **23 A. I have no idea who all of the folks are**
09:42:43 **24 that have asked us to test talc. You would, again,**
09:42:46 **25 have to ask Dr. Longo.**
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09:42:47 **1 Q.** You just don't know where the money comes
09:42:49 **2** from for your work?
09:42:50 **3** MS. O'DELL: Object to the form.
09:42:51 **4** THE WITNESS: No.
09:42:51 **5 Q.** (By Mr. Chachkes) Have you ever testified
09:42:54 **6** in a federal court about testing talc? A federal
09:42:57 **7** court.
09:42:57 **8 A. I don't think so.**
09:42:59 **9 Q.** Has any federal court ever said your work
09:43:01 **10** or your methodology has passed Daubert or standards
09:43:04 **11** for scientific rigor?
09:43:06 **12 A. I want to say yes to that.**
09:43:08 **13 Q.** And why do you want to say yes to that?
09:43:09 **14 A. Because I believe they have, but I would**
09:43:11 **15 have to check the record.**
09:43:12 **16 Q.** What about has any federal court ever said
09:43:14 **17** your methodology or your work regarding to talc
09:43:19 **18** analysis has passed Daubert standards for scientific
09:43:22 **19** rigor?
09:43:23 **20** MS. O'DELL: Object to the form.
09:43:24 **21** THE WITNESS: That I don't believe has
09:43:25 **22** been done.
09:43:27 **23 Q.** (By Mr. Chachkes) How many publications
09:43:29 **24** do you have in the peer-reviewed literature?
09:43:31 **25 A. I hadn't counted them. They're on my CV.**
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09:43:34 **1 You can count them.**
09:43:35 **2 Q.** How many were not funded by MAS?
09:43:42 **3** MS. O'DELL: Object to the form.
09:43:43 **4 Q.** (By Mr. Chachkes) If any?
09:43:44 **5 A. Not funded by MAS?**
09:43:46 **6 Q.** Yeah.
09:43:47 **7 A. None of them were funded by MAS.**
09:43:49 **8 Q.** Who were they funded by?
09:43:51 **9 A. Again, most all of them were done as pure**
09:43:56 **10 research and the -- well, I guess if you're looking**
09:44:02 **11 at it as funded by, I don't know what you mean by**
09:44:04 **12 funded by MAS. But we essentially -- when you do a**
09:44:09 **13 research study, it's typically not funded by anybody.**
09:44:12 **14 Q.** So this is -- were all your peer-reviewed
09:44:17 **15** publications done based on work done at MAS?
09:44:21 **16 A. Yes. Well, not all of them. I mean,**
09:44:25 **17 there were a lot of them I did at graduate school,**
09:44:27 **18 yes.**
09:44:27 **19 Q.** So other than your graduate school
09:44:29 **20** peer-reviewed publications where your -- are your
09:44:33 **21** peer-reviewed publications from your work at MAS?
09:44:35 **22 A. All of them? At this point I'd have to go**
09:44:41 **23 and look.**
09:44:41 **24 Q.** Okay.
09:44:41 **25 A. I can't recall.**
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09:44:42 **1 Q.** For those peer-reviewed works that you
09:44:45 **2** published based on work done at MAS, the underlying
09:44:49 **3** work at MAS was funded by someone; correct?
09:44:53 **4** MS. O'DELL: Object to the form.
09:44:54 **5** THE WITNESS: No, not necessarily. No.
09:44:56 **6** We did work that wasn't funded by others that
09:45:00 **7** were published.
09:45:01 **8 Q.** (By Mr. Chachkes) So you've done work at
09:45:03 **9** MAS that was purely academic, not really funded by
09:45:07 **10** anybody or for any purpose other than academics?
09:45:09 **11** MS. O'DELL: Object to the form.
09:45:10 **12** THE WITNESS: To my knowledge, yes.
09:45:11 **13 Q.** (By Mr. Chachkes) And how many of your
09:45:13 **14** publications could qualify as that?
09:45:15 **15 A. Again, I don't know, I would have to go**
09:45:19 **16 and look.**
09:45:19 **17 Q.** Would you agree it's important to disclose
09:45:23 **18** sources of funding for publications in peer-reviewed
09:45:27 **19** literature?
09:45:27 **20 A. Sure.**
09:45:27 **21 Q.** Are there any publications you have that
09:45:31 **22** were funded by plaintiffs' lawyer monies?
09:45:34 **23** MS. O'DELL: Object to the form.
09:45:36 **24** THE WITNESS: Again, I would have to go --
09:45:37 **25** I would have to look.
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09:45:38 **1** Q. (By Mr. Chachkes) Okay.
09:45:39 **2** A. **Off the top of my head, I don't recall.**
09:45:41 **3** Q. But if it were, it would be important to
09:45:43 **4** disclose that fact?
09:45:44 **5** A. **And it would be disclosed because the**
09:45:46 **6** **publications, the editorial process requires that.**
09:45:49 **7** Q. And there's no publications in the
09:45:53 **8** peer-reviewed literature regarding testing for
09:45:57 **9** talc -- testing talc; right?
09:46:00 **10** MS. O'DELL: Object to the form. Object
09:46:01 **11** to the form.
09:46:02 **12** THE WITNESS: Your question again, I'm
09:46:03 **13** sorry?
09:46:03 **14** Q. (By Mr. Chachkes) You don't have any
09:46:04 **15** peer-reviewed publications regarding the testing of
09:46:06 **16** talc; right?
09:46:07 **17** A. **I don't, no.**
09:46:07 **18** Q. What about peer-reviewed publications
09:46:12 **19** regarding the testing of talc in ovarian tissue?
09:46:14 **20** MS. O'DELL: Object to the form. Are you
09:46:15 **21** talking about his publications or in --
09:46:18 **22** MR. CHACHKES: Of course, yes.
09:46:20 **23** MS. O'DELL: It's not clear on the
24 question.
25 THE WITNESS: Yeah.
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09:46:20 **1** MS. O'DELL: So would you ask the question
09:46:21 **2** again, please.
09:46:21 **3** Q. (By Mr. Chachkes) Do you have any
09:46:23 **4** publications in the peer-reviewed literature about
09:46:23 **5** testing ovarian tissue for talc?
09:46:26 **6** A. **No.**
09:46:27 **7** Q. Do you have any publications in the
09:46:30 **8** peer-reviewed literature about testing ovarian tissue
09:46:35 **9** for asbestos?
09:46:35 **10** A. **No.**
09:46:38 **11** Q. Do you have any publications -- actually,
09:46:45 **12** skip that.
09:46:49 **13** Have you been a coauthor on all of
09:46:51 **14** Dr. Longo's reports testing Johnson & Johnson talcum
09:46:58 **15** powder products?
09:46:58 **16** A. **The answer to that is I don't know. A**
09:47:04 **17** **number of them, yes.**
09:47:05 **18** Q. Okay. Are you aware of any report by
09:47:08 **19** Dr. Longo where he issued an expert report in
09:47:11 **20** litigation about testing Johnson Baby Powder and
09:47:15 **21** didn't have you as a coauthor?
09:47:17 **22** A. **I don't recall as I sit here.**
09:47:19 **23** Q. 2017, what percentage of your time did you
09:47:24 **24** spend working on talc-related litigation projects?
09:47:27 **25** A. **I always get that question. I have no**
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09:47:30 **1** **idea. I don't keep track of it.**
09:47:32 **2** Q. Over 50 percent?
09:47:34 **3** A. **Again, I don't know.**
09:47:35 **4** Q. It could be over 50 percent, but you don't
09:47:38 **5** know?
09:47:38 **6** MS. O'DELL: Object to the form.
09:47:39 **7** THE WITNESS: I do not know. It could be
09:47:40 **8** as little as 10 percent. It could be 5 percent.
09:47:43 **9** I don't know.
09:47:44 **10** Q. (By Mr. Chachkes) Could it be 50 percent?
09:47:46 **11** A. **No, I don't think so.**
09:47:47 **12** Q. 2018, what percentage of your time did you
09:47:50 **13** spend working on talc-related litigation projects?
09:47:53 **14** A. **Same answer.**
09:47:54 **15** Q. What's the majority of your time spent on
09:47:58 **16** at MAS?
09:47:58 **17** A. **At the laboratory?**
09:47:59 **18** Q. Just at MAS generally.
09:48:01 **19** A. **Oh, a variety of different things on a**
09:48:03 **20** **daily basis.**
09:48:04 **21** Q. If you had to pick one thing that you
09:48:07 **22** spend most of your time on, what's that?
09:48:09 **23** A. **Most of my time -- I would say most of my**
09:48:18 **24** **time is spent on technological issues surrounding**
09:48:23 **25** **analyses that we do.**
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09:48:24 **1** Q. Of what?
09:48:25 **2** A. **Of all kinds of materials.**
09:48:27 **3** Q. What material do you spend most of your
09:48:30 **4** time on?
09:48:31 **5** MS. O'DELL: Object to the form.
09:48:32 **6** THE WITNESS: What material did I spend
09:48:33 **7** most of my time on?
09:48:34 **8** Q. (By Mr. Chachkes) Correct.
09:48:35 **9** A. **That would vary by the week.**
09:48:36 **10** Q. Okay.
09:48:37 **11** A. **Yeah.**
09:48:37 **12** Q. There are weeks where it's asbestos;
13 right?
09:48:40 **14** A. **There can be some that are, yes.**
09:48:42 **15** Q. Okay. What's another material that you
09:48:44 **16** might have spent a majority of your time on that's
09:48:48 **17** not asbestos?
09:48:49 **18** MS. O'DELL: Object to the form.
09:48:50 **19** THE WITNESS: Tissue.
09:48:50 **20** Q. (By Mr. Chachkes) Tissue for looking at
09:48:51 **21** whether it contains asbestos?
09:48:52 **22** A. **In some cases, yes.**
09:48:53 **23** Q. Okay. What are -- I mean, is there a
09:48:57 **24** solid chunk of time, like really a significant chunk
09:49:01 **25** of your time, let's say, over 5 percent of a year
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09:49:04 **1** where you're spending doing some scientific work that
 09:49:06 **2** has nothing to do with talc or asbestos?
 09:49:09 **3 A. Yes.**
 09:49:09 **4 Q. Okay. What would that be?**
 09:49:11 **5 A. Well, once again, technological issues**
 09:49:17 **6 surrounding things at our laboratory. For instance,**
 09:49:19 **7 as a chief science officer I get all kinds of**
 09:49:22 **8 questions about what we're looking at as far as**
 09:49:27 **9 instrumentation in our laboratory in order to do**
 09:49:30 **10 certain kinds of analyses.**
 09:49:34 **11 We have clients -- potential clients that**
 09:49:38 **12 call in and they want to do an analysis on maybe a**
 09:49:42 **13 drug of some kind, something like that.**
 09:49:44 **14 So it would be up to me working with**
 09:49:47 **15 another scientists there at the laboratory to**
 09:49:50 **16 understand what resources we need to be able to do**
 09:49:52 **17 that kind of test, whether we will do that kind of**
 09:49:55 **18 test.**
 09:49:55 **19 Q. Do you bill for your time working for**
 09:50:01 **20 plaintiffs in talc cases?**
 09:50:03 **21 A. Yes.**
 09:50:03 **22 Q. Do you write down the hours?**
 09:50:05 **23 A. I do keep some of the hours, yes.**
 09:50:08 **24 Q. Okay. You say some? There's some times**
 09:50:12 **25 you work for plaintiffs' lawyers and you don't charge**
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09:50:14 **1** them?
 09:50:15 **2 MS. O'DELL: Object to the form.**
 09:50:16 **3 THE WITNESS: Uh-huh. Yes.**
 09:50:17 **4 Q. (By Mr. Chachkes) Why?**
 09:50:18 **5 A. Because it just happens.**
 09:50:19 **6 Q. But for the most part you bill for your**
 09:50:21 **7 time?**
 09:50:21 **8 A. Yes.**
 09:50:21 **9 Q. And --**
 09:50:23 **10 A. I don't bill for it. MAS bills for it.**
 09:50:25 **11 Yes.**
 09:50:26 **12 Q. Can you estimate how much time you spent**
 09:50:29 **13 working on the MDL projects?**
 09:50:30 **14 A. No. I think we already talked about that**
 09:50:34 **15 earlier.**
 09:50:35 **16 Q. Okay.**
 09:50:35 **17 A. Yep.**
 09:50:36 **18 Q. Do you have any estimate as to what**
 09:50:44 **19 percentage of your time recently has been for**
 09:50:46 **20 litigation-related projects as opposed to**
 09:50:49 **21 nonlitigation-related projects?**
 09:50:51 **22 A. No.**
 09:50:51 **23 Q. Could it be 50 percent?**
 09:50:53 **24 MS. O'DELL: Objection.**
 09:50:54 **25 THE WITNESS: I have no idea.**
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09:50:55 **1 Q. (By Mr. Chachkes) Okay. You testified in**
 09:51:00 **2 your first talc case in the Ingham matter in Missouri**
 09:51:03 **3 last year?**
 09:51:04 **4 A. Yes.**
 09:51:05 **5 Q. You testified regarding your tissue**
 09:51:07 **6 analysis?**
 09:51:07 **7 A. Yes.**
 09:51:08 **8 Q. And you testified at trial about**
 09:51:09 **9 extrapolating asbestos content from TEM testing;**
 09:51:14 **10 correct?**
 09:51:14 **11 A. Yes.**
 09:51:14 **12 Q. Do you know how much money MAS has made in**
 09:51:19 **13 asbestos litigation over the years?**
 09:51:20 **14 A. I have no idea.**
 09:51:21 **15 Q. Do you know how much money MAS has made**
 09:51:24 **16 over -- for talc litigation over the years?**
 09:51:26 **17 A. No.**
 09:51:26 **18 Q. You have no involvement in that aspect**
 09:51:29 **19 of --**
 09:51:29 **20 A. I wouldn't know.**
 09:51:33 **21 Q. To your knowledge, did MAS ever test**
 09:51:37 **22 cosmetic talcum powder for asbestos before being**
 09:51:40 **23 engaged by plaintiffs' lawyers for that kind of work?**
 09:51:43 **24 MS. O'DELL: Object to the form.**
 09:51:44 **25 THE WITNESS: The answer to that question**
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09:51:45 **1 is probably.**
 09:51:47 **2 Q. (By Mr. Chachkes) Why do you say**
 09:51:48 **3 probably?**
 09:51:48 **4 A. Because of the work that has been done**
 09:51:54 **5 over the years. We did quite a bit of testing in the**
 09:51:58 **6 past, I believe, on talc that was used in industrial**
 09:52:09 **7 applications; but also the suppliers use the same**
 09:52:13 **8 kind of talc in, for instance, cosmetics and drug**
 09:52:19 **9 applications.**
 09:52:19 **10 Q. So it's your testimony that talc**
 09:52:22 **11 manufacturers use the same exact talc for industrial**
 09:52:26 **12 purposes and cosmetic purposes?**
 09:52:27 **13 A. No, that's not my testimony.**
 09:52:29 **14 MS. O'DELL: Object to form.**
 09:52:30 **15 Q. (By Mr. Chachkes) Did MAS ever -- I'm**
 09:52:30 **16 going to focus on the word cosmetic here.**
 09:52:32 **17 A. Okay.**
 09:52:33 **18 Q. Did MAS ever test cosmetic talcum powder**
 09:52:37 **19 for asbestos prior to being engaged to do that work**
 09:52:38 **20 for plaintiffs' lawyers?**
 09:52:39 **21 MS. O'DELL: Object to the form.**
 09:52:40 **22 THE WITNESS: The answer to that again, as**
 09:52:43 **23 I said before, is probably.**
 09:52:45 **24 Q. (By Mr. Chachkes) Okay. So was it J&J**
 09:52:49 **25 cosmetic talcum powder? Colgate cosmetic talcum**
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09:52:53 **1** powder? What cosmetic talcum powder do you think
09:52:58 **2** that was?
09:52:58 **3 A. I don't know. I do know, again, that a**
09:53:00 **4 number of different types of talcum powders were**
09:53:03 **5 tested at MAS prior to this litigation.**
09:53:04 **6 Q.** Well, you cited some industrial talcum
09:53:14 **7 powder --**
09:53:14 **8 A. Yes. Well, I just used a --**
09:53:14 **9 THE REPORTER:** Wait. One at a time.
09:53:14 **10 THE WITNESS:** Sorry. Ask the question
09:53:16 **11 again.**
09:53:16 **12 Q.** (By Mr. Chachkes) Okay. You have no
09:53:18 **13 specific memory of testing any cosmetic talcum powder**
09:53:22 **14 prior to being engaged by plaintiff lawyers to do**
09:53:27 **15 this?**
09:53:27 **16 MS. O'DELL:** Object to the form.
09:53:28 **17 THE WITNESS:** Again, now you've asked the
09:53:32 **18 question differently than before. The answer**
09:53:36 **19 again is, as I said, MAS has been involved in**
09:53:40 **20 testing talcum powders in the past prior to this**
09:53:44 **21 litigation, and some of them most probably were**
09:53:49 **22 cosmetic types, too.**
09:53:50 **23 Q.** (By Mr. Chachkes) When you say most
09:53:52 **24 probably, did you have a personal involvement in**
09:53:53 **25 those testings?**
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09:53:54 **1 A. Being at the laboratory and seeing samples**
09:54:01 **2 that have come in and had come in over that period of**
09:54:05 **3 time, again, the answer to that is probably.**
09:54:09 **4 Q.** Okay. So but what about personally
09:54:11 **5 involved in the experimentation on talc prior to**
09:54:14 **6 being engaged by plaintiff lawyers, were you**
09:54:17 **7 personally involved in any such investigations?**
09:54:20 **8 A. The answer to that is probably also.**
09:54:22 **9 Q.** Okay. So you've run TEM on talcum powder
09:54:26 **10 at MAS prior to being engaged by --**
09:54:29 **11 A. Well, when you say --**
09:54:31 **12 MS. O'DELL:** Object to the form.
09:54:31 **13 THE WITNESS:** -- personally involved,
09:54:33 **14 again, part of the work that I have done in the**
09:54:36 **15 past as a laboratory manager would be to be at**
09:54:39 **16 the location where the analyst is analyzing that**
09:54:41 **17 talc or that product and looking over their**
09:54:45 **18 shoulder and seeing what they're doing. So that**
09:54:48 **19 would be the personal involvement right there.**
09:54:50 **20 Q.** (By Mr. Chachkes) Okay. Can you name any
09:54:58 **21 cosmetic talcum powder that MAS looked at prior to**
09:55:00 **22 being engaged at -- engaged by plaintiff lawyers to**
09:55:03 **23 do that, to look at cosmetic talcum powder?**
09:55:06 **24 A. I can't recall that as I sit here.**
09:55:08 **25 Q.** Okay. Do you believe MAS is the best lab
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09:55:12 **1** in the world to analyze talc for asbestos?
09:55:15 **2 MS. O'DELL:** Object to the form.
09:55:16 **3 THE WITNESS:** I like the way you put that.
09:55:19 **4 Do like that.**
09:55:22 **5 I would say that, yes, we're one of the**
09:55:26 **6 best in the world, yes.**
09:55:26 **7 Q.** (By Mr. Chachkes) Can you name some
09:55:28 **8 others that are in your league?**
09:55:30 **9 MS. O'DELL:** Object to the form.
09:55:31 **10 THE WITNESS:** Well, that again calls for a
09:55:35 **11 judgment on these other laboratories. So, you**
09:55:42 **12 know, I respect the other laboratories that are**
09:55:44 **13 doing this work. But as far as best in the**
09:55:48 **14 world, I would put MAS right there.**
09:55:50 **15 Q.** (By Mr. Chachkes) Okay. The question was
09:55:51 **16 what other laboratories are up there?**
09:55:53 **17 A. I think Jim Millette's lab was -- is**
09:56:00 **18 definitely up there.**
09:56:02 **19 Q.** What about McCrone?
09:56:03 **20 A. Yes.**
09:56:04 **21 Q.** Are there academic laboratories that can
09:56:09 **22 analyze for asbestos in talc at the level you do?**
09:56:13 **23 A. Academic laboratories?**
09:56:14 **24 Q.** Yes.
09:56:15 **25 A. With the quality control we have? I can't**
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09:56:20 **1 think of any.**
09:56:21 **2 Q.** Okay. You do better analysis of
09:56:23 **3 asbestos -- of talc for asbestos than academic**
09:56:26 **4 laboratories that focus on mineralogy exclusively?**
09:56:29 **5 MS. O'DELL:** Object to the form.
09:56:30 **6 THE WITNESS:** When it comes to quality
09:56:32 **7 control, yes.**
09:56:32 **8 Q.** (By Mr. Chachkes) What about in terms of
09:56:35 **9 accurate results?**
09:56:36 **10 A. Same. Same answer.**
09:56:37 **11 Q.** Are MAS's analyses of talc for asbestos
09:56:44 **12 reproducible by other labs?**
09:56:48 **13 MS. O'DELL:** Object to the form.
09:56:49 **14 THE WITNESS:** Again, I don't know how to
09:56:50 **15 answer that. But they should be if they use the**
09:56:54 **16 same technologies and techniques.**
09:56:57 **17 Q.** (By Mr. Chachkes) Even though their
09:56:58 **18 quality controls aren't up to your standards?**
09:57:01 **19 MS. O'DELL:** Object to the form.
09:57:02 **20 THE WITNESS:** Oh, well, in that case the
09:57:03 **21 answer is I couldn't tell you.**
09:57:04 **22 Q.** (By Mr. Chachkes) Okay. So there's no
09:57:05 **23 lab you can cite right now -- academic, professional,**
09:57:09 **24 industrial, or otherwise -- that can reproduce your**
09:57:13 **25 results with the same accuracy?**
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09:57:14 **1** MS. O'DELL: Object to the form. That's
09:57:15 **2** not his question.
09:57:17 **3** **Q.** (By Mr. Chachkes) It's a question.
09:57:18 **4** **A.** **Ask it a different way.**
09:57:20 **5** **Q.** No.
09:57:21 **6** Can you reread the question, please.
09:57:31 **7** (The record was read by the reporter.)
09:57:32 **8** MS. O'DELL: Object to the form.
09:57:33 **9** THE WITNESS: Well, if they -- again, if
09:57:34 **10** they use the same techniques, they should be
09:57:38 **11** able to, sure.
09:57:39 **12** **Q.** (By Mr. Chachkes) Okay. So anyone
09:57:46 **13** following the ISO 22262 protocol should be able to
09:57:50 **14** reproduce your results?
09:57:51 **15** MS. O'DELL: Object to the form.
09:57:53 **16** THE WITNESS: If they're following the
09:57:54 **17** protocol, it's most likely that they could, yes.
09:57:56 **18** **Q.** (By Mr. Chachkes) Okay. Has MAS received
09:58:01 **19** any accolades from any academic institutions for its
09:58:07 **20** testing of talc?
09:58:07 **21** **A.** **Academic institutions?**
09:58:09 **22** **Q.** Yes.
09:58:09 **23** **A.** **I have no idea.**
09:58:11 **24** **Q.** Has any renowned -- nationally or
09:58:15 **25** internationally renowned TEM scientist identified MAS
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09:58:19 **1** as one of the best labs in the world for testing
09:58:22 **2** talc?
09:58:23 **3** MS. O'DELL: Object to the form.
09:58:24 **4** THE WITNESS: Well, I think if you want to
09:58:25 **5** talk about good laboratories in that kind of
09:58:27 **6** testing, you would definitely look to NIST NVLAP
09:58:33 **7** as the national standard for TEM laboratories
09:58:36 **8** and testing. So, you know, they would -- you
09:58:44 **9** know, based on their assessments, their audits
09:58:47 **10** of our laboratory, then I would say yes.
09:58:49 **11** **Q.** (By Mr. Chachkes) Okay. So NIST and
09:58:51 **12** NVLAP have told MAS that you're one of the best labs
09:58:55 **13** in the world for testing talc?
09:58:57 **14** MS. O'DELL: Object to the form.
09:58:58 **15** THE WITNESS: No, they don't say things
09:58:59 **16** like that.
09:58:59 **17** **Q.** (By Mr. Chachkes) Okay. They just
09:59:00 **18** accredit you?
09:59:00 **19** **A.** **Yeah, of course. Yeah.**
09:59:02 **20** **Q.** They didn't give you some super
09:59:04 **21** accreditation that only you get or you're above and
09:59:07 **22** beyond other laboratories; correct?
09:59:08 **23** **A.** **No --**
09:59:08 **24** MS. O'DELL: Object to the form.
09:59:10 **25** THE WITNESS: -- there's no such thing.
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09:59:11 **1** **Q.** (By Mr. Chachkes) All right. So let me
2 ask the same question again.
09:59:11 **3** Are there any nationally or
09:59:13 **4** internationally renowned TEM scientists that have
09:59:14 **5** identified MAS as one of the best labs in the world
09:59:17 **6** for testing talc?
09:59:18 **7** MS. O'DELL: Object to the form.
09:59:19 **8** THE WITNESS: Well, let me answer it.
09:59:20 **9** There haven't been any that haven't said we're
09:59:23 **10** not the best either, okay?
09:59:25 **11** **Q.** (By Mr. Chachkes) Have any nationally or
09:59:28 **12** internationally renowned PLM scientists identified
09:59:31 **13** MAS as one of the best labs -- strike that.
09:59:35 **14** Have you ever presented at any conferences
09:59:37 **15** about testing talc with TEM?
09:59:40 **16** **A.** **No.**
09:59:40 **17** **Q.** Have you ever presented any conferences
09:59:42 **18** about testing talc with PLM?
09:59:44 **19** **A.** **No.**
09:59:44 **20** **Q.** Have you ever presented -- have you ever
09:59:50 **21** been invited to any conferences on the subject matter
09:59:53 **22** of testing talc?
09:59:55 **23** **A.** **I can't recall any invitations.**
09:59:57 **24** **Q.** When did you personally first learn about
10:00:01 **25** the ISO 22262-2 TEM method?
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10:00:05 **1** **A.** **Oh, I don't know, a couple of years ago.**
10:00:08 **2** **Q.** From whom did you learn it?
10:00:09 **3** **A.** **I can't recall.**
10:00:14 **4** **Q.** When was the first time that anyone at MAS
10:00:21 **5** tested a talc sample using the ISO 22262 method?
10:00:25 **6** **A.** **It probably was a couple of years ago, I**
10:00:28 **7** **would think.**
10:00:29 **8** **Q.** Sometime in 2017?
10:00:30 **9** MS. O'DELL: Object to form.
10:00:31 **10** THE WITNESS: Again, I don't know an exact
10:00:32 **11** date for that.
10:00:33 **12** **Q.** (By Mr. Chachkes) Could it have been in
10:00:34 **13** 2016?
10:00:34 **14** **A.** **I don't know. We have been using it for**
10:00:36 **15** **quite a while. So as far as the exact date, I don't**
10:00:40 **16** **know.**
10:00:40 **17** **Q.** Could it have be in 2015?
10:00:42 **18** MS. O'DELL: Object to the form.
10:00:43 **19** THE WITNESS: I don't know.
10:00:44 **20** **Q.** (By Mr. Chachkes) You're the lab manager;
10:00:46 **21** right? You were --
10:00:46 **22** **A.** **I was for a time, yes.**
10:00:47 **23** **Q.** Okay. Would you be aware of any ISO 22262
10:00:52 **24** test of talc in your laboratory?
10:00:56 **25** **A.** **Yes.**
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10:00:56 **1 Q.** Could the first test have been in 2018?
10:01:00 **2 A.** Again, I don't know. It's been at least,
10:01:04 **3 I don't know, two or three years at least.**
10:01:06 **4 Q.** Okay. Did your analyst use ISO 22262 on
10:01:13 **5** any talc samples prior to the testing reported on in
10:01:16 **6** this report?
10:01:17 **7** MS. O'DELL: Object to the form.
10:01:18 **8** THE WITNESS: I don't know.
10:01:19 **9 Q.** (By Mr. Chachkes) Your report includes
10:01:27 **10** EDXA spectra for several particles; correct?
10:01:29 **11 A.** The reports do, yes.
10:01:30 **12 Q.** Yeah. What is EDXA?
10:01:35 **13 A.** Energy dispersive spectroscopy -- x-ray
10:01:38 **14 energy dispersive spectroscopy.**
10:01:38 **15 Q.** Can you identify a particle of asbestos
10:01:39 **16** using EDXA alone?
10:01:42 **17 A.** You mean a fiber, that type of thing, a
10:01:45 **18 bundle, fiber bundle? You're just saying particle,**
10:01:45 **19 so --**
10:01:50 **20 Q.** Okay.
10:01:50 **21 A.** Yeah, I'm just trying to be specific.
10:01:52 **22 Q.** So was the answer different to my question
10:01:54 **23** whether I used the word particle or a fiber or
10:01:56 **24** bundle?
10:01:57 **25 A.** No.
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10:02:00 **1 Q.** Okay. So let me ask again.
10:02:00 **2 A.** Okay.
10:02:02 **3 Q.** Can you identify a particle of asbestos by
10:02:04 **4** EDXA alone?
10:02:06 **5 A.** Yes. Well, no, not by just EDXA, no.
10:02:10 **6 Q.** Okay. Why not?
10:02:11 **7 A.** Well, they have the chemistry, and they
10:02:14 **8 would be similar to the chemistry of another type of**
10:02:17 **9 fiber too.**
10:02:18 **10 Q.** Can you distinguish anthophyllite from
10:02:21 **11** talc using EDXA alone?
10:02:24 **12 A.** No. You need other methodologies, and
10:02:29 **13 that's what we use. We use a suite of methodologies.**
10:02:32 **14 Q.** Can you distinguish anthophyllite from
10:02:39 **15** cummingtonite with EDXA alone?
10:02:41 **16 A.** The answer to that is no.
10:02:43 **17 Q.** So for the EDXA process, walk me through
10:02:50 **18** the steps. What do you do?
10:02:52 **19 A.** Where do you want to start on that?
10:02:55 **20 Q.** Well, you've got a particle?
10:02:56 **21 A.** Okay.
10:02:57 **22 Q.** You've decided I want to do EDXA on that?
10:03:01 **23 A.** Right.
10:03:01 **24 Q.** What do you do next?
10:03:02 **25 A.** Well, essentially what the analyst does is
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10:03:04 **1 they will set the microscope up for the EDX process,**
10:03:10 **2 and that involves setting some lenses and condensers**
10:03:14 **3 in there so that you can focus the beam on the**
10:03:17 **4 particle.**
10:03:17 **5 Then the beam is focused. The**
10:03:20 **6 spectrometer is put into place in the microscope.**
10:03:24 **7 Then you, of course, begin the process of collecting**
10:03:29 **8 x-rays from the specimen.**
10:03:31 **9 Q.** And then you get an EDXA spectrum?
10:03:35 **10 A.** Yes.
10:03:36 **11 Q.** Let's look at an example spectrum so you
10:03:39 **12** could tell me about it. There's probably one that's
10:03:42 **13** already been marked.
10:03:52 **14** I'm going to present to you with what was
10:03:54 **15** marked yesterday as Longo Number 12. Do you see
10:03:57 **16** that?
10:03:57 **17 A.** Yes.
10:03:58 **18 Q.** And that's an EDXA spectra from your
10:04:03 **19** expert report; correct?
10:04:05 **20** MS. O'DELL: Object to the form.
10:04:07 **21** THE WITNESS: If it's from our report,
10:04:09 **22** yes.
10:04:09 **23 Q.** (By Mr. Chachkes) Okay. It is from your
10:04:11 **24** report. So is that what an EDXA spectra looks like?
10:04:20 **25 A.** Yes.
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10:04:21 **1 Q.** And you'll notice on the bottom left-hand
10:04:26 **2** corner it says elements and it has got some elements
10:04:28 **3** and it says total?
10:04:29 **4 A.** Yes.
10:04:29 **5 Q.** Your software can generate information
10:04:31 **6** that fills in that; correct?
10:04:32 **7 A.** Yes.
10:04:33 **8 Q.** Why don't you turn that -- why don't you
10:04:35 **9** use it, that software?
10:04:36 **10 A.** We do.
10:04:38 **11 Q.** Okay. Why in these experiments did you
10:04:41 **12** not put in the information that can be generated on
10:04:45 **13** the bottom left-hand side of Exhibit 12?
10:04:48 **14** MS. O'DELL: Object to the form.
10:04:49 **15** THE WITNESS: Well, there could be any
10:04:50 **16** number of reasons for that. Typically, when
10:04:54 **17** we're looking at these types of particles, they
10:04:58 **18** have characteristic spectra for the -- if it's a
10:05:02 **19** particular asbestos type.
10:05:03 **20** For instance, this is tremolite. You can
10:05:07 **21** turn the -- the data's there, so you can turn
10:05:12 **22** that data on to show you what the oxides are for
10:05:15 **23** the oxides.
10:05:16 **24 Q.** (By Mr. Chachkes) Is it a coincidence
10:05:19 **25** that the data was not turned on for any of these, or
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10:05:22 **1** were the analysts actually instructed not to turn it
10:05:25 **2** on?
10:05:25 **3** **A. No, it's not a coincidence.**
10:05:27 **4** **Q.** Okay. They were instructed to not
10:05:28 **5** generate that data?
10:05:29 **6** **A. No. No, no, no. No.**
10:05:31 **7** **Q.** Now, is it standard operating practice not
10:05:36 **8** to generate that data?
10:05:37 **9** **A. Is it standard operating practice --**
10:05:39 **10** **Q.** -- at MAS not to generate that data?
10:05:41 **11** **A. They don't have to generate it. It's not**
10:05:43 **12** **required.**
13 **Q.** Okay.
10:05:43 **14** **A. It's not required by the method.**
10:05:45 **15** **Q.** Is that data in the software, you just
10:05:51 **16** choose not to print it out?
10:05:53 **17** MS. O'DELL: Object to the form.
10:05:54 **18** THE WITNESS: I would have to check on
10:05:55 **19** that to see. So that's my answer to that right
10:05:59 **20** now.
10:05:59 **21** **Q.** (By Mr. Chachkes) Okay.
10:06:00 **22** **A. Yeah.**
10:06:00 **23** **Q.** And is that data -- you wouldn't
10:06:04 **24** deliberately delete that data; right?
10:06:06 **25** **A. No, never.**
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10:06:07 **1** **Q.** Is that data still at MAS, that if I asked
10:06:10 **2** you to redo these with the data printed out, could
10:06:12 **3** you do it?
10:06:13 **4** **A. I don't know. We would have to ask Bill**
10:06:16 **5** **to see if it, in fact, is. It depends on the**
10:06:21 **6** **software.**
10:06:23 **7** **Q.** Okay.
10:06:23 **8** **A. Yeah.**
10:06:24 **9** MR. CHACHKES: We would request that data
10:06:25 **10** be produced. So if -- we'll make a formal
10:06:30 **11** request for that.
10:06:30 **12** MS. O'DELL: I think the data that's
10:06:32 **13** available has been produced, it's provided in
10:06:34 **14** the report, and so there's no further data.
10:06:36 **15** **Q.** (By Mr. Chachkes) We'll --
10:06:37 **16** **A. Well, this is adequate to tell if this is**
10:06:39 **17** **a characteristic spectrum of tremolite, but you can't**
10:06:44 **18** **say, well, we know this is tremolite. We have other**
10:06:46 **19** **methods that have to be coupled together to be able**
10:06:48 **20** **to, you know, 99.9 percent say it is.**
10:06:52 **21** **Q.** I'm just talking about the data down
10:06:53 **22** there.
10:06:54 **23** **A. Okay.**
10:06:54 **24** **Q.** Let's look at what was marked yesterday as
10:06:56 **25** Exhibit 13. If you could look at like the last page.
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10:07:08 **1** Maybe just flip it up to the last page.
2 **A. Okay.**
10:07:10 **3** **Q.** You see there, it's an EDXA printout.
10:07:15 **4** This is not yours.
5 **A. Sure.**
10:07:15 **6** **Q.** This is from Connecticut.
10:07:17 **7** **A. Uh-huh.**
10:07:17 **8** **Q.** And you see that -- it looks like it was
10:07:18 **9** generated from the same software as yours, it's the
10:07:21 **10** same fonts, same format. Is that a reasonable
10:07:24 **11** conclusion?
10:07:25 **12** **A. I don't know --**
10:07:26 **13** MS. O'DELL: Object to the form.
10:07:27 **14** THE WITNESS: -- we'd have to see. You
10:07:29 **15** know, they're all -- there are a number of
10:07:31 **16** different EDS software packages out there.
10:07:34 **17** **Q.** (By Mr. Chachkes) Do you know the name of
10:07:36 **18** your EDS software package?
10:07:38 **19** **A. I want to say it's called Revolutions.**
10:07:40 **20** **Q.** Are there different versions of the
10:07:42 **21** Revolution software?
10:07:43 **22** **A. I don't know.**
10:07:44 **23** **Q.** And the information in the lower left, you
10:07:48 **24** see that's generated for each of the relevant
10:07:52 **25** elements, weight percentage, standard deviation,
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10:07:55 **1** atomic percentage, oxide percentage, other
10:07:56 **2** information; do you see that?
10:07:57 **3** **A. Yes.**
10:07:58 **4** **Q.** Can you generate all that information if
10:08:00 **5** you wanted to for your EDXA?
10:08:04 **6** MS. O'DELL: Object to the form.
10:08:06 **7** THE WITNESS: Again, it depends on the way
10:08:07 **8** the software operates, if it's set up to be able
10:08:11 **9** to collect that information and make those
10:08:12 **10** statistics.
10:08:12 **11** **Q.** (By Mr. Chachkes) For the EDXA
10:08:15 **12** experiments that you ran for the purposes of the MDL
10:08:18 **13** report, would you be able to generate that
10:08:21 **14** information or you just don't know?
10:08:23 **15** MS. O'DELL: Object to form.
10:08:24 **16** THE WITNESS: I don't know.
10:08:24 **17** **Q.** (By Mr. Chachkes) Okay. Do you
10:08:27 **18** understand that that information, some people find
10:08:30 **19** that useful?
10:08:31 **20** MS. O'DELL: Objection.
10:08:31 **21** THE WITNESS: It can be, yeah.
10:08:33 **22** **Q.** (By Mr. Chachkes) Why?
10:08:33 **23** **A. Well, it can be useful in -- for instance,**
10:08:37 **24** **if you're a research geologist and you're trying to**
10:08:41 **25** **determine the composition and the makeup of an**
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10:08:43 **1** unknown, that would be very helpful.
10:08:44 **2** Q. Okay. Why is it very helpful?
10:08:46 **3** A. Again, if they are -- if they're trying to
10:08:49 **4** understand the composition of these materials, then
10:08:52 **5** that information is part of info to try to figure out
10:09:00 **6** what you're working with.
10:09:01 **7** Q. That information that we're talking about
10:09:05 **8** a researcher can use to estimate the composition, the
10:09:11 **9** chemical composition, of the subject particle; right?
10:09:14 **10** MS. O'DELL: Object to form.
10:09:14 **11** THE WITNESS: Yeah, they can estimate it.
10:09:15 **12** They can estimate it.
10:09:16 **13** MS. O'DELL: Dr. Rigler, give me just a
10:09:19 **14** second before you answer.
10:09:20 **15** THE WITNESS: Sure. Sorry.
10:09:20 **16** MS. O'DELL: Thank you.
10:09:20 **17** Q. (By Mr. Chachkes) And one of the ways you
10:09:23 **18** do that is by -- you take the ratios of the peak
10:09:29 **19** areas of the metals to the silicon; right?
10:09:32 **20** A. That's one way to do it.
10:09:33 **21** Q. And if you were going to generate peak
10:09:40 **22** areas for your EDXA you could do that; right?
10:09:43 **23** A. Yeah. I would say yes to that. Again, I
10:09:46 **24** would have to look at the package to see what's in
10:09:49 **25** there.
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10:09:49 **1** Q. It's pretty fundamental. I would think
10:09:51 **2** all packages have that; right?
10:09:53 **3** MS. O'DELL: Object to the form.
10:09:54 **4** THE WITNESS: Yes, but they vary in the
10:09:55 **5** software, the way that the company has put the
10:09:59 **6** software together.
10:10:00 **7** Q. (By Mr. Chachkes) Okay. So this process
10:10:02 **8** of comparing ratios of metals to silicon, are you
10:10:06 **9** comparing peak areas or just simply peak heights?
10:10:09 **10** A. Again, that varies. In a lot of cases
10:10:13 **11** it's peak heights if you're working with -- depending
10:10:17 **12** on what your methodology is.
10:10:18 **13** For instance, I believe one of the
10:10:21 **14** standard methodologies for asbestos analysis is in
10:10:24 **15** the AHERA regulations, and I believe there they use
10:10:30 **16** peak ratios in that, which I believe are based on
10:10:33 **17** peak heights.
10:10:34 **18** Q. Okay. And what about for an unknown
10:10:40 **19** chemical or crystal, what's more useful to determine
10:10:46 **20** the chemical composition, peak heights or peak areas?
10:10:49 **21** MS. O'DELL: Object to the form.
10:10:50 **22** THE WITNESS: Either one can be used,
10:10:51 **23** depending upon how you're calibrated.
10:10:54 **24** Q. (By Mr. Chachkes) It's your belief that
10:10:55 **25** the peer-reviewed literature reflects that either
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10:10:59 **1** peak heights or peak areas can be used to determine
10:11:02 **2** the chemical composition of the subject of an EDXA
10:11:04 **3** analysis?
10:11:05 **4** A. Well --
10:11:05 **5** MS. O'DELL: Object.
10:11:06 **6** THE WITNESS: -- if we step back a minute,
10:11:12 **7** these kinds of spectra are not the kinds of
10:11:15 **8** spectra that we get when we're doing something
10:11:17 **9** like mass spectrometer where we're really
10:11:20 **10** looking at an area under a peak. You can do
10:11:24 **11** peak heights on those, half width max types of
10:11:29 **12** estimates with those.
10:11:31 **13** These are spectrometers, and what they do
10:11:33 **14** is they collect data in electron channels for
10:11:37 **15** electron voltage. So typically what you do is
10:11:41 **16** you bombard your specimen with the electron beam
10:11:46 **17** for a period of time to get enough counts so
10:11:50 **18** that the peaks are stable at a stable height,
10:11:54 **19** and then you can compare the peak heights.
10:11:57 **20** So peak area, you know, for this kind of a
10:12:02 **21** spectrometer, again, you'll get different
10:12:04 **22** opinions, but it's not the same type of thing
10:12:07 **23** with the mass spectrometer. So peak heights
10:12:09 **24** work very well for these.
10:12:11 **25** Q. (By Mr. Chachkes) Okay. It's not a
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10:12:12 **1** question about what works very well or --
10:12:15 **2** A. Well, it is kind of a question about what
10:12:16 **3** works really well.
10:12:17 **4** Q. Okay. Focus on my question.
10:12:18 **5** A. I hear you, but you're kind of going to
10:12:21 **6** it --
10:12:21 **7** Q. Focus on my question.
10:12:23 **8** A. I'm focusing.
10:12:24 **9** Q. The question is about peer-reviewed
10:12:27 **10** literature --
10:12:27 **11** A. Let me just finish.
10:12:28 **12** MS. O'DELL: Sorry.
10:12:29 **13** THE WITNESS: Let me finish. I'm not
10:12:29 **14** finished.
10:12:30 **15** MS. O'DELL: Please finish.
10:12:33 **16** THE WITNESS: Okay. Peak heights work
10:12:34 **17** very well for this type of a spectrometer. Now,
10:12:38 **18** we can get in all the minutia of area versus
10:12:41 **19** peak height, but we have to know what kind of
10:12:44 **20** system that we're talking about.
10:12:46 **21** Q. (By Mr. Chachkes) Same question.
10:12:47 **22** A. Okay.
10:12:48 **23** Q. Focus on what I'm asking, which is about
10:12:50 **24** the peer-reviewed literature.
25 A. Okay.
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10:12:51 **1** Q. In the peer-reviewed literature where
10:12:53 **2** folks are looking at EDXA spectra to determine the
10:12:57 **3** chemical composition of an unknown subject --
10:13:00 **4** A. Okay.
10:13:01 **5** Q. -- does the peer-reviewed literature
10:13:04 **6** support both using peak heights and peak area to make
10:13:07 **7** that determination?
10:13:09 **8** MS. O'DELL: Object to the form.
10:13:10 **9** THE WITNESS: I would have to review the
10:13:12 **10** literature. Standard methods use peak height.
10:13:19 **11** Some may use peak area also. So as far as that,
10:13:22 **12** I would have to go and review it.
10:13:24 **13** Q. (By Mr. Chachkes) When you say standard
10:13:25 **14** methods, you mean in the peer-reviewed literature or
10:13:28 **15** something else?
10:13:28 **16** A. Sure. It would be -- if it's a standard
10:13:31 **17** method it's going to be peer-reviewed.
10:13:33 **18** Q. Okay. Looking at Exhibit 12 again, going
10:13:40 **19** back to your EDXA printout, did you do a
10:13:46 **20** comprehensive review of what minerals could
10:13:50 **21** correspond to this EDXA spectra other than what you
10:13:55 **22** believe it to be, which is tremolite?
10:13:57 **23** A. I didn't do a comprehensive review of
10:13:59 **24** this.
10:13:59 **25** Q. Did anybody do a comprehensive review of
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10:14:02 **1** the EDXA spectra to determine what other minerals
10:14:05 **2** they could correspond to?
10:14:07 **3** A. A comprehensive review. What do you mean
10:14:13 **4** by that?
10:14:13 **5** Q. So, for example, if an expert in
10:14:16 **6** mineralogy and EDXA mineralogy were to tell you this
10:14:19 **7** spectra in Exhibit 12 can correspond to dozens if not
10:14:24 **8** hundreds of other minerals, sitting here today, do
10:14:26 **9** you have any reason to dispute that?
10:14:27 **10** MS. O'DELL: Object to the form.
10:14:29 **11** THE WITNESS: I would say that it could
10:14:31 **12** correspond to a number of other minerals, yes.
10:14:34 **13** MR. CHACHKES: Okay.
10:14:35 **14** MS. O'DELL: Alex, excuse me. We've been
10:14:38 **15** going about an hour, a little over an hour. Can
10:14:40 **16** we take a short break, please?
10:14:41 **17** MR. CHACHKES: Yeah. Let me see if I can
10:14:43 **18** finish this part.
10:14:44 **19** MS. O'DELL: Are you ready for a break,
10:14:46 **20** Doctor?
10:14:46 **21** THE WITNESS: Sure.
10:14:48 **22** MR. CHACHKES: That's fine, we'll take a
10:14:50 **23** break.
10:14:51 **24** (Recess from 10:14 a.m. to 10:37 a.m.)
10:38:00 **25** Q. (By Mr. Chachkes) We spoke earlier about
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10:38:03 **1** you record your time; correct?
10:38:05 **2** A. As far as recording the time --
10:38:08 **3** Q. Yes.
10:38:09 **4** A. Yes, some of it, but not all of it.
10:38:11 **5** Q. Okay. And who do you give those time
10:38:13 **6** sheets to?
10:38:13 **7** A. I don't -- as I say, I go in and speak to
10:38:20 **8** Bill's assistant and then give her the hours that I
10:38:25 **9** have.
10:38:25 **10** Q. Is it your understanding that the other
10:38:26 **11** people in your laboratory are giving their hours to
10:38:28 **12** Bill's assistant?
10:38:29 **13** A. I don't know what they're doing.
10:38:31 **14** Q. Okay. Have they been instructed to keep
10:38:33 **15** their time?
10:38:33 **16** A. You'd have to ask Bill about that.
10:38:36 **17** Q. Okay. So I'd like to request of
10:38:37 **18** plaintiffs all invoices billed on behalf of the MDL
10:38:41 **19** at MAS.
10:38:46 **20** So let's --
10:38:48 **21** A. I wanted to -- before we got started, I
10:38:51 **22** wanted to bring up a point about the publications,
10:38:52 **23** because I know you were asking about that.
10:38:54 **24** Q. Okay.
10:38:54 **25** A. And it is our policy at our laboratory to
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10:38:58 **1** not discuss any possible publications that we may
10:39:02 **2** have pending. It's part of our policy, and it's
10:39:06 **3** actually what we consider as proprietary.
10:39:13 **4** MR. CHACHKES: I'm going to ask counsel
10:39:14 **5** again, are you going to allow me to ask a full
10:39:18 **6** set of questions about what the pending
10:39:19 **7** publication is?
10:39:20 **8** MS. O'DELL: No.
10:39:20 **9** MR. CHACHKES: Okay. We'll raise it with
10:39:21 **10** the magistrate.
10:39:21 **11** MS. O'DELL: He's answered your question.
10:39:23 **12** These are the invoices. It's two copies of one
10:39:26 **13** invoice, and you're welcome to ask him questions
10:39:28 **14** about it if you'd like.
10:39:29 **15** MR. CHACHKES: Okay. And we're also
10:39:30 **16** requesting all invoices from all people for who
10:39:35 **17** do bill time, the analysts, Bill, the works.
10:39:39 **18** MR. PARFITT: We'll take that under
10:39:39 **19** advisement.
10:39:39 **20** MS. O'DELL: Your request is noted. There
10:39:43 **21** will be an objection to that.
10:39:45 **22** MR. CHACHKES: Okay. Let's just mark --
10:39:47 **23** let me see if these are different. Yeah.
10:39:49 **24** MS. O'DELL: Let's see.
10:39:51 **25** MR. CHACHKES: Yeah, they're different.
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10:39:51 **1** One is for 9,000 and one is for 14.
10:39:54 **2** MS. O'DELL: Oh, yeah.
10:39:56 **3** **Q.** (By Mr. Chachkes) By the way, did you
10:39:59 **4** bring any documents with you today?
10:40:00 **5** **A.** **I did.**
10:40:00 **6** **Q.** What documents did you bring with you?
10:40:02 **7** **A.** **Let me get them out.**
10:40:11 **8** MS. O'DELL: May I see those just a minute
10:40:13 **9** to make sure.
10:40:19 **10** THE WITNESS: The request.
10:40:20 **11** **Q.** (By Mr. Chachkes) You don't have to hand
10:40:22 **12** them to me, just tell me what they are.
10:40:24 **13** **A.** **Okay. Let's see. This is the notice of**
10:40:27 **14** **oral and videotaped deposition.**
10:40:28 **15** **Q.** Well, let me just ask this question. Did
10:40:29 **16** you bring any documents that I might not already
10:40:31 **17** have? So I have your report, I have the subpoena, I
10:40:36 **18** have the things lawyers exchange. Is there
10:40:40 **19** anything --
10:40:40 **20** **A.** **You have the quality report?**
10:40:42 **21** **Q.** Yes, we have the quality report; correct?
10:40:45 **22** And you brought that?
10:40:46 **23** **A.** **I brought a copy of that. There was one**
10:40:48 **24** **minor typographical error I found in that.**
10:40:50 **25** **Q.** We'll get to that.
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10:40:52 **1** **A.** **Okay.**
10:40:52 **2** **Q.** Anything else you brought that I might not
10:40:54 **3** otherwise have?
10:40:55 **4** **A.** **You probably have everything. I brought**
10:40:59 **5** **the starting weight sheets, the weight sheets that**
10:41:04 **6** **we've used for the analysis. I think you guys had**
10:41:09 **7** **requested all of that. What else? And the reports.**
10:41:11 **8** **The same ones that you have here.**
10:41:13 **9** **Q.** So starting weight sheets, have those been
10:41:16 **10** produced?
10:41:17 **11** **A.** **Yeah, I think they were sent over.**
10:41:19 **12** MS. O'DELL: Yes, those were produced. I
10:41:21 **13** have one more invoice. I would ask that you not
10:41:24 **14** mark this one because I need a clean copy and I
10:41:26 **15** don't know why I don't have one in my folder,
10:41:29 **16** actually, so I'll get a copy at the break.
10:41:31 **17** MR. CHACHKES: Okay. Do you mind if I
10:41:32 **18** take a photo of it?
10:41:33 **19** MS. O'DELL: No. You're welcome to.
10:41:34 **20** MR. CHACHKES: Okay. We will start with
10:41:35 **21** that and then we can --
10:41:35 **22** MS. O'DELL: Yeah. I'll copy it at the
23 break. I just would prefer --
24 MR. CHACHKES: Oh, we'll copy it at the
25 break. So why don't we do this, why don't we --
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10:41:38 **1** MS. O'DELL: I just prefer that that not
10:41:41 **2** be marked.
10:41:42 **3** MR. CHACHKES: Why don't we hold up the
10:41:43 **4** invoices until a break. I don't have to ask
10:41:45 **5** about them now. We'll do it as a set. I don't
10:41:47 **6** want to --
10:41:47 **7** MS. O'DELL: Sure.
10:41:48 **8** **Q.** (By Mr. Chachkes) Okay. All right. Back
10:41:51 **9** to EDXA.
10:41:52 **10** **A.** **All right.**
10:41:54 **11** **Q.** So -- now, you're aware that crystals have
10:42:05 **12** certain characteristic ratios of metals to silicon?
10:42:08 **13** **A.** **Yes.**
10:42:09 **14** **Q.** Okay. And are you aware that tremolite
10:42:11 **15** has a ratio of 5-to-8?
10:42:14 **16** **A.** **It can vary.**
10:42:16 **17** **Q.** When you say it can vary, what do you mean
10:42:19 **18** by that?
10:42:19 **19** **A.** **Well, it can vary. I mean, per the**
10:42:22 **20** **formula based on how many metal ions that tremolite**
10:42:27 **21** **has, it can vary a bit.**
10:42:29 **22** **Q.** When you say a bit, what's the margin
10:42:32 **23** error there?
10:42:33 **24** **A.** **You know, as far as a margin of error,**
10:42:36 **25** **peak height ratios, that type of thing, it just**
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10:42:41 **1** **varies. So, you know, it varies.**
10:42:45 **2** **Q.** Do you have any opinion sitting here today
10:42:47 **3** as to what the peer-reviewed literature suggests as
10:42:51 **4** the acceptable variations when you're looking at an
10:42:54 **5** EDXA for determining a mineral from the
10:42:58 **6** metal-to-silicon ratio?
10:42:59 **7** MS. O'DELL: Object to form.
10:43:01 **8** THE WITNESS: I would have to look at the
10:43:05 **9** literature to see what they are because I know
10:43:08 **10** over the years as I've looked at different
10:43:11 **11** references, and I've noticed the slightly
10:43:14 **12** different, you know, ratios for the same
10:43:17 **13** material.
10:43:18 **14** **Q.** (By Mr. Chachkes) Okay. Because the
10:43:19 **15** ratio actually should be a certain number because
10:43:22 **16** it's based on the chemical formula which is what the
10:43:25 **17** definition of the mineral is; correct?
10:43:27 **18** **A.** **Well, yes, but by electron spectroscopy**
10:43:32 **19** **you can have a variation in the energy depending upon**
10:43:36 **20** **takeoff angle and this and that kind of thing,**
10:43:39 **21** **depending on the material. So you can have some**
10:43:42 **22** **variation there. You know, purely based on the**
10:43:44 **23** **formula, again, using a spectrometer, you're going to**
10:43:48 **24** **get some variation.**
10:43:48 **25** **Q.** Okay. But ideally the ratio is going to
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10:43:52 **1** be a definite number because it's based on the
10:43:57 **2** chemical formula, and the chemical formula for a
10:43:58 **3** mineral is set in stone, as it were?
4 MS. O'DELL: Object to the form.
10:44:02 **5** THE WITNESS: Well, again, now, if you're
10:44:03 **6** just talking about the formula, then, yes, you
10:44:05 **7** would have ratios based on the formula. You
10:44:08 **8** know, forget the EDXA for a minute.
10:44:10 **9** But based on the chemical formula and the
10:44:12 **10** loading of the ions, you know, in that formula,
10:44:15 **11** you're going to have, you know, a set amount
10:44:19 **12** there. But when it comes to the actual
10:44:21 **13** spectroscopy you're going to have a little bit
10:44:23 **14** of variation.
10:44:24 **15** **Q.** (By Mr. Chachkes) Okay. And just by way
10:44:25 **16** of example, anthophyllite, the chemical formula, has
10:44:29 **17** seven magnesiums, eight silicon; right?
10:44:32 **18** **A.** Uh-huh.
10:44:33 **19** **Q.** Is that a yes?
10:44:34 **20** **A.** Yes.
21 **Q.** I'm sorry --
10:44:38 **22** **A.** It's okay.
10:44:38 **23** **Q.** -- show up on the transcript.
10:44:38 **24** And then that ratio of 7-to-8 is the ideal
10:44:44 **25** metal-to-silicon ratio under EDXA for anthophyllite?
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10:44:48 **1** **A.** Well, no, that's for the formula. That
10:44:50 **2** would be for the formula. Once again, when you get
10:44:53 **3** to a spectroscopic method, it's going to vary a bit.
10:44:57 **4** **Q.** So did you -- so in Exhibit 12, do you see
10:45:03 **5** how tremolite is written there at the top?
10:45:05 **6** **A.** Yes.
10:45:05 **7** **Q.** That's not what the machine generated
10:45:07 **8** based on the spectra; you typed that in; correct?
10:45:12 **9** **A.** The analyst typed that in, yes. But that
10:45:14 **10** correlates with tremolite, with a tremolite spectrum.
10:45:18 **11** **Q.** And so do you expect in this Exhibit 12
10:45:25 **12** EDXA spectra that the ratio of metal to silicon is
10:45:31 **13** going to be 5-to-8 or somewhere in the vicinity of
10:45:34 **14** 5-to-8?
10:45:35 **15** **A.** It could be, yes.
10:45:36 **16** **Q.** And when you say it could be, would you
10:45:42 **17** identify something that has a metal-to-silicon ratio
10:45:45 **18** nowhere near 5-to-8 as tremolite under EDXA?
10:45:49 **19** MS. O'DELL: Object to the form.
10:45:50 **20** THE WITNESS: Can you just restate the
10:45:52 **21** question, please?
10:45:53 **22** **Q.** (By Mr. Chachkes) Okay. What margin of
10:45:54 **23** error in the metal-to-silicon ratio would be so great
10:45:59 **24** that you would say, well, that's not tremolite?
10:46:02 **25** **A.** Well, again, if, for instance, in this
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10:46:07 **1** spectrum, in Number 12, if the magnesium was up in
10:46:11 **2** the middle somewhere up high towards the silicon
10:46:14 **3** peak, you might have a question about it at that
10:46:16 **4** point. If the calcium peak was down lower, then you
10:46:20 **5** might have a question about it at that point too.
10:46:22 **6** So you can get some variation again like
10:46:26 **7** that, depending upon the mineralogy of tremolite in
10:46:29 **8** that area. So again, you're going to have a little
10:46:32 **9** bit of variation. But if it's too far away from
10:46:35 **10** that, then, yeah, there's a question about that.
10:46:37 **11** **Q.** Do you have any opinions sitting here
10:46:39 **12** today whether the EDXA spectra in 12 is more like
10:46:44 **13** another mineral than tremolite?
10:46:47 **14** MS. O'DELL: Object to the form.
10:46:48 **15** THE WITNESS: Well, I don't have an
10:46:50 **16** opinion on that right now.
10:46:52 **17** **Q.** (By Mr. Chachkes) And so did you actually
10:46:55 **18** run the metal-to-silicon ratios for your EDXA?
10:46:59 **19** MS. O'DELL: Object to the form.
10:47:00 **20** THE WITNESS: I didn't run it, no.
10:47:02 **21** **Q.** (By Mr. Chachkes) Okay. Did anybody run
10:47:03 **22** it?
10:47:03 **23** **A.** I don't know. I would have to check.
10:47:04 **24** **Q.** As the author of the expert report that
10:47:09 **25** has these EDXA spectra upon which you're making
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10:47:12 **1** conclusions, wouldn't that be important information
10:47:14 **2** to know?
10:47:14 **3** MS. O'DELL: Object to the form.
10:47:21 **4** MS. PARFITT: Objection.
10:47:22 **5** THE WITNESS: The information that we have
10:47:23 **6** from the spectrometer is accurate, and the peak
10:47:29 **7** ratios that you see here are consistent with
10:47:34 **8** tremolite. It could be consistent with some
10:47:37 **9** other minerals. That's why we do not use EDS;
10:47:42 **10** that's why we would do electron diffraction, and
10:47:45 **11** we also look at the shape and the form of the
10:47:47 **12** material, too. So those things together allow
10:47:51 **13** us to say, yeah, this is tremolite.
10:47:53 **14** **Q.** (By Mr. Chachkes) Okay. Do you go into
10:47:54 **15** the EDXA -- do you take the EDXA spectra, say, I'm
10:48:02 **16** going to assume it's an asbestos and now I'm going to
10:48:05 **17** figure out which one? You don't do that, do you?
10:48:07 **18** MS. O'DELL: Object to the form.
10:48:08 **19** THE WITNESS: Typically what happens is
10:48:12 **20** the analyst will take a spectrum, they'll look
10:48:17 **21** at the spectrum, then they will flip over -- and
10:48:20 **22** they're in the same spot, they'll refigure the
10:48:24 **23** scope, and then they will do electron
10:48:26 **24** diffraction.
10:48:26 **25** They'll look at the diffraction pattern,
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10:48:28 **1** and then they will make a decision at that
10:48:29 **2** particular point as to whether it's consistent
10:48:32 **3** with that form or not. Then they'll index the
10:48:35 **4** pattern. They'll confirm that with verification
10:48:38 **5** of the indexing of the pattern.
10:48:39 **6** **Q.** (By Mr. Chachkes) Okay. So the EDXA --
10:48:44 **7** so the judgment call by the analyst to what mineral
10:48:48 **8** they're looking at is based on a combined looking at
10:48:51 **9** the EDXA spectra and the SAED?
10:48:56 **10** **A.** Yes, and also the form. The form.
10:49:02 **11** **Q.** And when you say the form, what do you
10:49:03 **12** mean, the form?
10:49:04 **13** **A.** Well, for instance, if it's a round
10:49:09 **14** structure or something that is not fibrous or
10:49:12 **15** crystalline as you would expect tremolite to be,
10:49:14 **16** then, you know, it's a guess as it could be some
10:49:17 **17** other form.
10:49:19 **18** **Q.** Can you cite to me any peer-reviewed
10:49:21 **19** literature or textbook, even, that says taking
10:49:26 **20** simultaneously the data from an EDXA, SAED, and the
10:49:32 **21** form is the proper way to identify a mineral?
10:49:37 **22** MS. O'DELL: Object to the form.
10:49:38 **23** THE WITNESS: Well, I mean, if you want to
10:49:39 **24** look at the way EPA said to do it and continues
10:49:42 **25** to say to do it, you know, in the '70s and the
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10:49:47 **1** '80s and was published, this is the way to do
10:49:50 **2** it.
10:49:50 **3** **Q.** (By Mr. Chachkes) Okay. So you've cited
10:49:52 **4** the EPA. Anything else, any other published sources?
10:49:55 **5** **A.** It's also done -- there are a number
10:49:57 **6** of ASTM -- they are referenced here in our report.
10:49:59 **7** **Q.** Okay. Is it your opinion that 22262
10:50:03 **8** sanctions that methodology?
10:50:05 **9** **A.** To my knowledge, yes.
10:50:06 **10** **Q.** Okay. And when you say EPA, what document
10:50:09 **11** are you referring to?
10:50:10 **12** **A.** That would be the AHERA document.
10:50:15 **13** CFR 763.
10:50:15 **14** **Q.** And so if you're cited CFR -- say it
10:50:21 **15** again?
10:50:21 **16** **A.** 763.
10:50:22 **17** **Q.** 763?
10:50:23 **18** **A.** Yep.
10:50:23 **19** **Q.** And then we cited 22262. Any other
10:50:26 **20** document that supports your methodological approach?
10:50:29 **21** **A.** Let me look here. We've referenced them
10:50:32 **22** here. There are a couple of ASTMs too. There's an
10:50:36 **23** ISO document -- well, the ISO is the 22 -- let me see
10:50:39 **24** which ones we've got.
10:50:45 **25** The ASTM D5755-09, D5756, the ISO 10312,
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10:51:03 **1** and there's also ISO 13794. The EPA one's here, it's
10:51:12 **2** 40 CFR part 763. They're on page 11 of the report.
10:51:19 **3** **Q.** Okay. Any other published literature that
10:51:21 **4** approves of this method that you're using?
10:51:23 **5** MS. O'DELL: Object to the form.
10:51:25 **6** THE WITNESS: Probably there are, but
10:51:28 **7** these are major standards that are used.
10:51:32 **8** **Q.** (By Mr. Chachkes) Sitting here today can
10:51:33 **9** you think of any others?
10:51:34 **10** **A.** I'm trying to think of them. As I sit
10:51:40 **11** here, I can't, but I know there are some others.
10:51:42 **12** **Q.** Okay.
10:51:42 **13** **A.** Yeah.
10:51:43 **14** **Q.** Now, let's take, for example, 22262.
10:51:48 **15** There's a section on EDXA; correct?
10:51:54 **16** **A.** To my knowledge there is, yes.
10:51:55 **17** **Q.** Right. And there's a section on SAED?
10:51:58 **18** **A.** I would have to look at it. I don't have
10:52:00 **19** it right in front of me.
10:52:01 **20** **Q.** Okay.
10:52:01 **21** **A.** If you've got it, I'll look at it. I
10:52:03 **22** don't have it right in front of me.
10:52:03 **23** **Q.** Does 22262 expressly say you consider the
10:52:08 **24** EDXA and SAED together even though that independently
10:52:12 **25** they may be inconclusive?
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10:52:13 **1** **A.** I --
10:52:13 **2** MS. O'DELL: Excuse me.
10:52:15 **3** Dr. Rigler, I've got a copy here that was
10:52:17 **4** marked, if you need to see 22262-2. I'll
10:52:20 **5** provide it to you if counsel will not do that.
10:52:23 **6** THE WITNESS: Okay.
10:52:23 **7** **Q.** (By Mr. Chachkes) Let me ask this
10:52:24 **8** question. Are you able to answer the question --
10:52:26 **9** MS. PARFITT: Give him a chance to look at
10:52:28 **10** the document.
10:52:28 **11** MR. CHACHKES: I'm going to ask the
10:52:30 **12** question. You can --
10:52:30 **13** MS. PARFITT: No. Give him a chance,
10:52:30 **14** Alex --
10:52:30 **15** **Q.** (By Mr. Chachkes) Can you answer --
10:52:33 **16** MS. PARFITT: Alex, he's not going to
10:52:34 **17** answer the question.
10:52:34 **18** **Q.** (By Mr. Chachkes) Can you answer the
10:52:35 **19** question without being given the document? That's a
10:52:37 **20** simple question. Can you --
10:52:37 **21** MS. PARFITT: We need to --
10:52:38 **22** MR. CHACHKES: Are you going to shut that
10:52:40 **23** down?
10:52:40 **24** MS. PARFITT: I'm going to tell him to
10:52:41 **25** look at the document. The appropriate thing --
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10:52:43 **1** MR. CHACHKES: Okay. Another list for the
10:52:43 **2** magistrate.
3 Go ahead.
10:52:45 **4** MS. PARFITT: Excuse me. Let's make it
10:52:46 **5** clear. So the question for the magistrate is
10:52:48 **6** when you talk about a document and the witness
10:52:50 **7** wants to see it, you want to bring up to the
10:52:53 **8** magistrate that you aren't going to give it to
10:52:55 **9** him? Is that the subject matter?
10:52:56 **10** MR. CHACHKES: Let's look at the
10:52:57 **11** transcript. Did he say he wanted to see it?
10:52:58 **12** You said he wanted to see it.
10:52:59 **13** MS. PARFITT: Dr. Rigler, would you like
10:53:02 **14** to see the document?
10:53:02 **15** THE WITNESS: Sure.
10:53:03 **16** MS. PARFITT: Thank you.
10:53:04 **17** MR. CHACHKES: All right.
10:53:05 **18** MS. PARFITT: It's amusing, isn't it? Why
10:53:08 **19** don't you act appropriate.
10:53:09 **20** **Q.** (By Mr. Chachkes) Anyway, is it your
10:53:10 **21** opinion that 22262 says you can take an inconclusive
10:53:15 **22** EDXA and you can take an inconclusive SAED and
10:53:19 **23** together make a determination of what mineral you're
10:53:22 **24** looking at?
10:53:23 **25** MS. O'DELL: Object to the form.
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10:53:24 **1** THE WITNESS: I would have to take a break
10:53:26 **2** to read it and review it, and then I can give
10:53:28 **3** you an answer to that question.
10:53:29 **4** **Q.** (By Mr. Chachkes) Okay. Sitting here
10:53:29 **5** today, you can't answer that off the top of your
10:53:32 **6** head?
10:53:32 **7** MS. PARFITT: Objection. Misstates his
10:53:34 **8** testimony.
9 THE WITNESS: That's right.
10 **Q.** (By Mr. Chachkes) Okay.
10:53:34 **11** **A.** **I could give you an answer. I just need**
10:53:36 **12** **some time to review the document.**
10:53:37 **13** **Q.** Okay. And is it the same answer for the
10:53:38 **14** other standards that you cited? Sitting here today,
10:53:42 **15** could you tell me just off the top of your head
10:53:44 **16** whether those other standards that you cited allow
10:53:47 **17** for someone to take an inconclusive SAED and
10:53:50 **18** inconclusive EDXA together with maybe a visual
10:53:56 **19** morphology decision and judge what mineral you're
10:53:59 **20** looking at?
10:54:00 **21** MS. O'DELL: Object to the form.
10:54:00 **22** THE WITNESS: Well, the answer to the
10:54:02 **23** question is these parts are required to be able
10:54:09 **24** to come up with an answer of what the mineral
10:54:11 **25** is.
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10:54:11 **1** So, yes, you start with an inconclusive;
10:54:15 **2** yes, you start with an inconclusive; yes, you
10:54:17 **3** start with an inconclusive; and you put those
10:54:19 **4** together to come up with a conclusive answer.
10:54:21 **5** **Q.** (By Mr. Chachkes) Okay.
10:54:21 **6** **A.** **Yep.**
10:54:22 **7** **Q.** At a break I would like you to look at
10:54:26 **8** your document --
10:54:28 **9** **A.** **Okay.**
10:54:28 **10** **Q.** -- and specifically look for somewhere
10:54:30 **11** where it says you can take three separate and
10:54:32 **12** independent inconclusive analytical results and
10:54:36 **13** combine them to make a conclusive result. Okay?
10:54:43 **14** MS. O'DELL: Object to the form.
10:54:44 **15** THE WITNESS: Well, let me just state that
10:54:48 **16** in science, one of the best ways to come up with
10:54:51 **17** a good answer is use multiple techniques to be
10:54:54 **18** able to make a conclusion. You use one
10:54:57 **19** particular technique, that's good. You use
10:55:02 **20** another technique in conjunction with that,
10:55:04 **21** that's better. Use three techniques in
10:55:07 **22** conjunction with that, that's very good.
10:55:09 **23** So typically this is the way that we work
10:55:13 **24** as scientists. So that's the way that these
10:55:19 **25** documents are written, you know. Again, a good
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10:55:22 **1** example is AHERA as to how they would do that,
10:55:24 **2** they want the scientists to do it.
10:55:25 **3** **Q.** (By Mr. Chachkes) Will you do me that
10:55:28 **4** favor of during a break look at 22262 and coming up
10:55:31 **5** with your specific opinion as to whether it allows
10:55:34 **6** for someone to take an inconclusive -- three
10:55:37 **7** inconclusive results, combine them for a conclusive
10:55:39 **8** result?
10:55:39 **9** MS. O'DELL: Object to the form.
10:55:40 **10** And you're not required to do any homework
10:55:42 **11** for counsel during a break.
10:55:45 **12** **Q.** (By Mr. Chachkes) Okay. So you will not
10:55:48 **13** during a break do that; correct?
10:55:49 **14** MS. PARFITT: You want him to do it right
10:55:51 **15** now? It's on your time.
10:55:53 **16** MR. CHACHKES: It's a question for the
10:55:54 **17** witness.
10:55:54 **18** MS. PARFITT: The question for the witness
10:55:56 **19** is -- you were asking him to do homework off the
10:55:59 **20** record on his break; am I correct? Is that what
10:56:01 **21** you're asking him?
10:56:02 **22** MR. CHACHKES: He has a --
10:56:02 **23** MS. PARFITT: Let me ask you a question.
10:56:03 **24** MR. CHACHKES: If you're just going to
10:56:04 **25** talk over me, there's no conversation here.
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10:56:05 **1** MS. PARFITT: You know, Alex, you have a
10:56:07 **2** difficult time talking over people as well, so
3 I'm not trying to --
10:56:10 **4** MR. CHACHKES: I'll let you finish. Go
5 ahead.
6 MS. PARFITT: Thank you. I appreciate
10:56:13 **7** that. It's very kind of you.
10:56:13 **8** Are you asking him to do a project for you
10:56:16 **9** on his break; is that what you're asking him?
10:56:18 **10** MR. CHACHKES: He has come here as an
10:56:20 **11** expert on the subject matter of how one
10:56:21 **12** determines whether there's asbestos in talc, and
10:56:23 **13** he has testified that there are various
10:56:24 **14** standards by which they sanction his
10:56:27 **15** methodology. I want a specific opinion as to
10:56:30 **16** how indeed that happens.
10:56:32 **17** So he should be able to do that. He
10:56:34 **18** should have come prepared for that. So I want
10:56:35 **19** him to read the document and come back with
10:56:38 **20** specifics. That's what I want.
10:56:39 **21** MS. PARFITT: Well, I think there may be a
10:56:41 **22** miscommunication. I don't think he's telling
10:56:43 **23** you he can't do it. The difference is if you
10:56:46 **24** want to ask him that question, he goes through
10:56:48 **25** it right now while we're on the record, that's
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10:56:51 **1** fine.
10:56:51 **2** MR. CHACHKES: I'll tell you what we'll
10:56:53 **3** do. I plan to finish without exhausting my
10:56:56 **4** seven-hour time. If it takes a few hours to go
10:57:00 **5** through documents, we'll do that at the end,
6 okay?
7 MS. PARFITT: Go through --
8 THE WITNESS: Well, I think --
10:57:02 **9** MR. CHACHKES: He can do it on the record.
10:57:02 **10** He can just sit there reading the documents on
10:57:04 **11** the record. We'll stay here until 9:00 if
10:57:06 **12** that's what's required.
10:57:08 **13** MS. PARFITT: That's fine.
10:57:11 **14** MR. CHACHKES: Okay. I mean, right now I
10:57:13 **15** understand the dispute to be not whether he can
10:57:17 **16** go through the documents and give me the answer.
10:57:18 **17** You just want it on the record.
10:57:19 **18** MS. PARFITT: What I would like to have on
10:57:20 **19** the record is your question and his response and
10:57:22 **20** he will tell you -- since I'm not testifying --
10:57:24 **21** he will tell you whether he can respond in kind
10:57:27 **22** to your question and in an appropriate manner.
10:57:30 **23** If the appropriate manner for him to respond to
10:57:33 **24** your question requires him to look at something,
10:57:36 **25** then he's entitled to do it.
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10:57:36 **1** MR. CHACHKES: And I would appreciate in
10:57:37 **2** the future when I ask those questions you don't
3 tell the witness how the appropriate manner is,
10:57:39 **4** that he is allowed to finish answering the
10:57:40 **5** questions.
10:57:41 **6** MS. PARFITT: Well, let's not trip a
10:57:43 **7** witness. I think let's have a very honest
10:57:45 **8** discussion with the witness, all right?
10:57:46 **9** So that's what we're trying to do is have
10:57:49 **10** an honest discussion with the witness, and I see
10:57:55 **11** you're trying to do that.
10:57:55 **12** Q. (By Mr. Chachkes) Okay. So you said the
10:57:58 **13** analyst is simultaneously doing an EDXA and an SAED;
14 correct?
10:58:03 **15** A. **They can.**
10:58:03 **16** Q. They can.
10:58:04 **17** A. **Well, I mean, simultaneously -- you have**
10:58:06 **18 to do one at a time, but you can do them essentially**
10:58:11 **19 in the same sitting.**
10:58:12 **20** Q. Would the analyst -- would it be
10:58:15 **21** appropriate for an analyst to take something like
10:58:18 **22** Exhibit 12 without having done the SAED yet, without
10:58:20 **23** having done visual morphology yet, to make a
10:58:23 **24** conclusion about what mineral they're looking at?
10:58:26 **25** A. **Well, that's not the way we do it.**
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10:58:30 **1** Q. Would it be appropriate to do it that way?
10:58:32 **2** A. **I'm telling you that's the way we do it.**
10:58:33 **3** Q. The question is as an expert in the area,
10:58:35 **4** is it appropriate to do it? If they did it, would it
10:58:37 **5** be inappropriate?
10:58:38 **6** A. **They could do it.**
10:58:39 **7** MS. O'DELL: Object to the form.
10:58:40 **8** THE WITNESS: They could do it if they
10:58:41 **9** wanted to, but that's not the way we do it.
10:58:43 **10** Q. (By Mr. Chachkes) Okay. And it wouldn't
10:58:44 **11** be inappropriate -- when I say inappropriate, bad
10:58:47 **12** science?
10:58:48 **13** MS. O'DELL: Object to the form.
10:58:49 **14** THE WITNESS: Bad science? I don't know
10:58:51 **15** what you mean by that.
10:58:52 **16** Q. (By Mr. Chachkes) Okay. So something
10:58:55 **17** that would not give you within a reasonable degree of
10:59:00 **18** scientific certainty the conclusion that, ah, this is
10:59:01 **19** the mineral I'm looking at?
10:59:02 **20** A. **Well, they would want to do that. They**
10:59:05 **21 would be required to do that at our laboratory.**
10:59:07 **22** Q. Yeah.
10:59:08 **23** A. **They wouldn't just look at one of these**
10:59:09 **24 and say, yeah, it's tremolite.**
10:59:11 **25** Q. Okay. But I'm asking -- it's not
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10:59:12 **1** empirically what's going on, so focus on the
 10:59:15 **2** question. The question is, is it bad science to take
 10:59:17 **3** only, like in Exhibit 12, EDXA and a spectrum and
 10:59:25 **4** make a conclusion about the mineral?
 10:59:27 **5** MS. O'DELL: Object to the form.
 10:59:28 **6** THE WITNESS: Is it bad science? It's
 10:59:31 **7** observation. They can make an observation which
 10:59:33 **8** may lead them to additional kinds of
 10:59:37 **9** observations. You may take an expert in
 10:59:40 **10** mineralogy who looks at this and goes yeah, it's
 10:59:43 **11** tremolite. You may take an expert in mineralogy
 10:59:46 **12** in academia that would say it was.
 10:59:49 **13** Q. (By Mr. Chachkes) Okay. So it is good
 10:59:50 **14** science to take something like the EDXA printout in
 10:59:54 **15** isolation and say I know what mineral that is?
 10:59:55 **16** MS. O'DELL: Object to the form.
 10:59:56 **17** Misstates his testimony.
 10:59:57 **18** THE WITNESS: Right, we -- again, that's
 10:59:59 **19** not the way that we do that at our laboratory.
 11:00:01 **20** And you may have an academic that does that
 11:00:03 **21** who's a crystallographer or mineralogist who
 11:00:06 **22** looks at that and goes, yeah, it's tremolite.
 11:00:09 **23** Q. (By Mr. Chachkes) So what is your
 11:00:16 **24** recommended procedure for -- when is the tremolite
 11:00:18 **25** typed in the top? Is it right after the EDXA
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11:00:20 **1** printout comes up?
 11:00:21 **2** A. Well, as I say, they've done the
 11:00:25 **3** diffraction, they've looked at this. They may do
 11:00:28 **4** another EDS on this to verify what they got to start
 11:00:31 **5** with, and then they would probably type that in there
 11:00:34 **6** then.
 11:00:34 **7** Q. Okay. I've seen no sample for which there
 11:00:36 **8** are two EDS. Does that mean we have not received
 11:00:39 **9** these duplicate EDS runs?
 11:00:42 **10** MS. O'DELL: Object to the form.
 11:00:43 **11** THE WITNESS: Well, no. Again, they may
 11:00:46 **12** do -- they may start to do an EDS on that, go,
 11:00:51 **13** yeah, that looks like tremolite, let me do the
 11:00:53 **14** diffraction on this, right, and then they may
 11:00:55 **15** come back and do a 300 seconds on the EDS.
 11:00:59 **16** So, you know, they're not going to call it
 11:01:01 **17** unless they're sure of it from the diffraction.
 11:01:05 **18** Q. (By Mr. Chachkes) Do you have a policy at
 11:01:08 **19** MAS for the order in which the various analyses are
 11:01:10 **20** done?
 11:01:10 **21** A. Well, we have a protocol for that --
 11:01:13 **22** Q. Okay.
 11:01:13 **23** A. -- yeah.
 11:01:13 **24** Q. Is it written?
 11:01:14 **25** A. To my knowledge, yes.
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11:01:15 **1** Q. Okay. I would ask that that be produced.
 11:01:18 **2** Sitting here now, do you remember what
 11:01:20 **3** that protocol is, which comes first, like EDS or SAED
 11:01:27 **4** or visual morphology under TEM?
 11:01:29 **5** A. Yeah, I want to say that it is EDS first,
 11:01:31 **6** and then they do the diffraction, but I would have to
 11:01:35 **7** look and see what it is.
 11:01:37 **8** Q. Do the analysts type in the mineral
 11:01:41 **9** identification at the top of the printout at the time
 11:01:45 **10** they do the EDS before they do the diffraction?
 11:01:48 **11** MS. O'DELL: Object to the form. Asked
 11:01:49 **12** and answered.
 11:01:49 **13** THE WITNESS: Again, I would have to -- I
 11:01:52 **14** would have to see. I can't recall right now.
 11:01:55 **15** They're not going to type that on there unless
 11:01:57 **16** they're sure that -- understand that.
 11:01:59 **17** Q. (By Mr. Chachkes) It's a question
 11:02:00 **18** about timing.
 11:02:01 **19** A. Yes, I understand the question about
 11:02:03 **20** timing. I get that. I get it.
 11:02:04 **21** They can start to do an EDS, then they can
 11:02:07 **22** do diffraction, and then they can make the call on
 11:02:11 **23** that. They're not going to make the call unless
 11:02:13 **24** they're sure.
 11:02:14 **25** Q. Do you know whether the -- so it's
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11:02:18 **1** possible that they go back into the software after
 11:02:22 **2** the diffraction and type in the name of the mineral
 11:02:26 **3** at the top of the EDS?
 11:02:27 **4** MS. O'DELL: Object to the form.
 11:02:28 **5** THE WITNESS: I don't know. I would have
 11:02:29 **6** to find out. But again, they're not going to
 11:02:32 **7** type that in there unless they're sure of it.
 11:02:34 **8** Q. (By Mr. Chachkes) Okay.
 11:02:34 **9** A. That's what you need to understand.
 11:02:35 **10** Q. Yeah, I know -- I understand your --
 11:02:35 **11** A. I want you to understand that. You don't
 11:02:37 **12** seem to understand that.
 11:02:38 **13** Q. You have said that ten times --
 11:02:39 **14** A. Good.
 11:02:40 **15** Q. -- it's on the record --
 11:02:41 **16** A. I want to make it clear.
 11:02:42 **17** Q. What I understand or don't understand is
 11:02:43 **18** really not at issue. It's what you understand, okay?
 11:02:46 **19** Do you understand that?
 11:02:46 **20** A. Sure.
 11:02:48 **21** Q. Okay.
 11:02:48 **22** A. And what I'm telling you is it's not typed
 11:02:50 **23** on there unless they're sure of it.
 11:02:52 **24** Q. All right. Now you've said that many
 11:02:52 **25** times.
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11:02:53 **1 A. I can say it again.**
11:02:54 **2 Q.** Okay. And so do you -- I guess I'd have
11:02:59 **3** to talk to the analyst to figure out how they do
11:03:01 **4** this.
11:03:01 **5** MS. O'DELL: Object to form.
11:03:02 **6** THE WITNESS: You can talk to Dr. Longo
11:03:03 **7** and he can also tell you.
11:03:04 **8 Q.** (By Mr. Chachkes) Yeah, but he's not
11:03:05 **9** doing the runs either, is he?
11:03:07 **10 A. Well, he directs the lab.**
11:03:08 **11 Q.** All right.
11:03:08 **12 A. So it's his responsibility.**
11:03:10 **13 Q.** Okay. And looking at Exhibit 12, the
11:03:18 **14** EDXA, what tells you that this is tremolite?
11:03:20 **15 A. The peak sets that you have here.**
11:03:23 **16 Q.** Okay. And when you say -- walk me through
11:03:26 **17** that.
11:03:26 **18 A. The peak sets?**
11:03:27 **19 Q.** Yes. Why are these peak sets tremolite
11:03:30 **20** and not some other mineral?
11:03:32 **21 A. Some other mineral. Well, again, until**
11:03:35 **22 you do the diffraction, you may not be completely**
11:03:38 **23 sure of it, but the mag and the silicon ratios look**
11:03:42 **24 correct and as well as the calcium ratios for**
11:03:44 **25 tremolite.**
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11:03:45 **1 Now, there's a small iron peak there. If**
11:03:47 **2 that iron peak was increased significantly, it would**
11:03:50 **3 be actinolite.**
11:03:52 **4 Q.** Okay. Are there any instances where your
11:04:01 **5** analysts get an EDS printout or spectra and say, ah,
11:04:09 **6** that's not an asbestos?
11:04:12 **7 A. I'm sure there are, yeah, yes.**
11:04:14 **8 Q.** Okay. Give me an instance where there's
11:04:16 **9** magnesium silicon peaks. What --
11:04:18 **10** MS. O'DELL: Object to the form.
11:04:18 **11 Q.** (By Mr. Chachkes) What were they looking
11:04:20 **12** for?
11:04:20 **13** MS. O'DELL: Object to the form.
11:04:21 **14** Incomplete hypothetical.
11:04:23 **15** THE WITNESS: Well, they may be looking at
11:04:27 **16** certain types of clay minerals that may have a
11:04:31 **17** mag-silicon ratio. You know, forget the calcium
11:04:34 **18** for a minute. But they may go, well, you know,
11:04:36 **19** that's not talc. They may do a diffraction on
11:04:39 **20** it and they get some diffuse pattern, something
11:04:42 **21** like that, and they go, you know, it's not that
11:04:44 **22** so they'll move on. Essentially it's sort of a
11:04:48 **23** screening process.
11:04:49 **24 Q.** (By Mr. Chachkes) Okay. Are there
11:05:00 **25** instances where an EDXA looks more like talc than
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11:05:10 **1** actinolite?
11:05:12 **2 A. Well -- it looks more like talc than**
11:05:19 **3 actinolite, you're saying?**
11:05:20 **4 Q.** Yeah.
11:05:21 **5 A. I'd have to think about that. It's**
11:05:23 **6 possible. Yeah, it's possible.**
11:05:25 **7 Q.** Okay. And what would you be looking for?
11:05:27 **8 A. Well, depending upon how much iron was in**
11:05:33 **9 there. You know, you can have fibrous talc that**
11:05:35 **10 would have, you know, some iron with it, that kind of**
11:05:39 **11 thing. So it would just depend on the -- it would**
11:05:41 **12 depend on the form and look at the diffraction**
11:05:43 **13 pattern.**
11:05:43 **14 Q.** Is there an EDXA in isolation that you
11:05:47 **15** would say that's definitely talc, it is not
11:05:50 **16** actinolite?
11:05:50 **17 A. Yeah, I mean, again, if the iron -- if it**
11:05:56 **18 practically has no iron and you're looking at the**
11:05:58 **19 form of it and it's a plate, you go, well, yeah,**
11:06:01 **20 that's most likely talc; you do the diffraction on**
11:06:05 **21 it, it's most likely talc.**
11:06:06 **22 Q.** So you brought in form, you brought in
11:06:07 **23** diffraction --
11:06:08 **24 A. Right.**
11:06:08 **25 Q.** -- so I'm saying let's put those aside.
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11:06:10 **1** Just in isolation, just looking at the EDXA, is there
11:06:13 **2** an EDXA that in isolation you can say that's
11:06:15 **3** definitely talc, it's not actinolite?
11:06:17 **4** MS. O'DELL: Object to the form.
11:06:18 **5** THE WITNESS: Again, if it had no iron --
11:06:24 **6** I mean, you're looking at the thing. It's not
11:06:26 **7** like you're not looking at it. It's on the
11:06:28 **8** screen in front of you, so you can't divorce
11:06:30 **9** that from it. So if I'm looking at the form of
11:06:32 **10** it, I can tell whether it's platy or whether
11:06:33 **11** it's fibrous.
11:06:35 **12 Q.** (By Mr. Chachkes) Okay. Is there an
11:06:38 **13** instance -- there's an EDXA in isolation that you
11:06:42 **14** know is definitely tremolite and not actinolite?
11:06:45 **15** MS. O'DELL: Object to the form.
11:06:47 **16** THE WITNESS: No. No, not in isolation.
11:06:49 **17 Q.** (By Mr. Chachkes) Okay. Do your analysts
11:07:02 **18** record peak heights?
11:07:03 **19 A. Do they record peak heights?**
11:07:06 **20 Q.** Yes.
11:07:06 **21 A. I don't think so.**
11:07:07 **22 Q.** Okay. Do they record peak areas?
11:07:10 **23 A. Again, the software does that.**
11:07:12 **24 Q.** The judgment that your analysts make when
11:07:17 **25** they're typing in the top of the EDXA of this
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11:07:19 **1** mineral --
11:07:20 **2** **A. Yes.**
11:07:20 **3** **Q.** -- as far as the EDXA printout goes, it's
11:07:22 **4** qualitative, not quantitative?
11:07:24 **5** **A. Well, yeah, it is a qualitative analysis**
11:07:28 **6** **as they're looking at this.**
11:07:29 **7** **Q.** And do you understand, when I say
11:07:31 **8** qualitative, it's not based on precise numbers, it's
11:07:34 **9** based on kind of their eyeball look at it?
11:07:36 **10** MS. O'DELL: Object to the form.
11:07:37 **11** THE WITNESS: That's the way most, I would
11:07:40 **12** say, laboratories do this.
11:07:41 **13** **Q.** (By Mr. Chachkes) So you include a lot of
11:07:48 **14** SAED patterns for -- in your report; right?
11:07:52 **15** **A. Yes.**
11:07:52 **16** **Q.** Okay. What is SAED?
11:07:53 **17** **A. Selected area electron diffraction.**
11:07:55 **18** **Q.** Can you just at a high level tell me how
11:07:58 **19** that works?
11:08:00 **20** **A. Tell you how it works?**
11:08:01 **21** **Q.** Yeah, just -- you know, you've got -- it's
11:08:03 **22** in the TEM, what do you do?
11:08:04 **23** **A. Yep. We talked about it a little bit**
11:08:07 **24** **before. You essentially set the microscope up to**
11:08:13 **25** **isolate the beam on the area of interest, and then**
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11:08:17 **1** **it's very much like -- the sample is much like a**
11:08:23 **2** **prism.**
11:08:24 **3** **You know how you hold a prism up in the**
11:08:26 **4** **light and it breaks it all up into colors. All**
11:08:28 **5** **right. So the reason that's happening is because the**
11:08:30 **6** **electrons or, in this case, the wavelength of light,**
11:08:33 **7** **is slowed so that you get the different colors.**
11:08:38 **8** **In this case, the electron beam goes**
11:08:40 **9** **through the specimen and it strikes the lattice**
11:08:44 **10** **planes. These are the planes that make up the**
11:08:46 **11** **crystal and they reflect off and they give you all of**
11:08:48 **12** **these spots, patterns. And they're specific for the**
11:08:51 **13** **kind of material that you're looking at.**
11:08:52 **14** **Q.** Okay. Can you identify a particle as
11:08:55 **15** asbestos with SAED alone?
11:08:58 **16** MS. O'DELL: Object to the form.
11:08:59 **17** THE WITNESS: You can get to an
11:09:06 **18** understanding of whether this is an amphibole,
11:09:11 **19** and then from there you need the other
11:09:12 **20** information to help make the conclusion.
11:09:15 **21** **Q.** (By Mr. Chachkes) And can you understand
11:09:20 **22** if a particle is an amphibole based on an SAED
11:09:25 **23** with -- in isolation that's only done with one axis?
11:09:27 **24** **A. Yes, you can could that.**
11:09:29 **25** **Q.** Okay. So you can see an SAED that's only
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11:09:32 **1** done in one axis, pick it up and say I am sure that's
11:09:36 **2** an amphibole?
11:09:36 **3** **A. Yeah, if you measure it out, if you do the**
11:09:40 **4** **verification, you know, you do the measurements on**
11:09:42 **5** **it, it will give you the lattice parameters of an**
11:09:46 **6** **amphibole of some type or, you know, maybe a**
11:09:49 **7** **serpentine of some type if it's chrysotile. And then**
11:09:52 **8** **you can go, yeah, this is a -- it possibly is at this**
11:09:56 **9** **point.**
11:09:56 **10** **Q.** Okay. I'm not asking if it possibly is.
11:09:58 **11** I'm saying is there a one-axis diffraction pattern
11:10:01 **12** that is uniquely -- strike that.
11:10:07 **13** **A. Yeah.**
11:10:07 **14** **Q.** If I had a one-axis diffraction pattern
11:10:12 **15** for a phyllosilicate, there's no way you're going to
11:10:15 **16** confuse that with an amphibole?
11:10:17 **17** **A. Probably not.**
11:10:19 **18** **Q.** Why not?
11:10:20 **19** **A. They're stacked layers versus what is in**
11:10:28 **20** **an amphibole where you have essentially -- I don't**
11:10:34 **21** **know how to describe it. They're like railroad iron,**
11:10:41 **22** **what do you call it, like railroad tracks. That's**
11:10:44 **23** **how they're stacked up in an amphibole; whereas in a**
11:10:47 **24** **phyllosilicate, you've got flat planes mostly.**
11:10:50 **25** **Q.** Okay. If I were to hand you a one-axis
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11:10:51 **1** SAED right now, you could tell me whether it was an
11:10:54 **2** amphibole versus a phyllosilicate?
11:10:56 **3** **A. Probably. I don't know if I could tell**
11:10:59 **4** **you as I sit here right now, but, you know, based on**
11:11:01 **5** **the knowledge of the planes, measuring the crystal**
11:11:08 **6** **planes, it's a good possibility you could say, yeah,**
11:11:10 **7** **it's probably an amphibole.**
11:11:11 **8** **Q.** Okay. Within a reasonable degree of
11:11:13 **9** scientific certainty?
11:11:13 **10** **A. Yeah, I think you could say that, but**
11:11:17 **11** **you'd want more data on it to be able to call the**
11:11:20 **12** **class.**
11:11:20 **13** **Q.** Did you do a comprehensive review of
11:11:23 **14** crystalline material to determine whether there are
11:11:28 **15** SAED patterns in one axis that look like amphiboles?
11:11:35 **16** MS. O'DELL: Object to the form.
11:11:36 **17** THE WITNESS: Well, I think the answer to
11:11:37 **18** that is there are a number of them, and
11:11:42 **19** depending upon the plane, the axis of the plane,
11:11:52 **20** you know, you've got to do the measurements on
11:11:54 **21** those.
11:11:54 **22** So the answer to that is there are a
11:11:57 **23** number of different planes; but in any one
11:12:00 **24** sitting, again, if you get a good diffraction
11:12:04 **25** pattern, you can still measure that pattern and
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<p>11:12:08 1 come up with whether it is an amphibole.</p> <p>11:12:10 2 Q. (By Mr. Chachkes) The original question</p> <p>11:12:12 3 is whether you did a comprehensive review of minerals</p> <p>11:12:14 4 other than amphiboles, other than serpentine, to</p> <p>11:12:17 5 determine whether there are one-axis SAED diffraction</p> <p>11:12:21 6 patterns that you can't without more axes determine</p> <p>11:12:25 7 whether it's an amphibole or another class. Did you</p> <p>11:12:29 8 do that?</p> <p>11:12:29 9 MS. O'DELL: Object to -- excuse me.</p> <p>11:12:30 10 MR. CHACHKES: Let me finish my question.</p> <p>11:12:31 11 Q. (By Mr. Chachkes) Did you do such a</p> <p>11:12:32 12 comprehensive review?</p> <p>11:12:34 13 MS. O'DELL: Objection to form. That</p> <p>11:12:35 14 wasn't the previous question. Object to the</p> <p>11:12:37 15 form.</p> <p>11:12:37 16 THE WITNESS: Well, I didn't do a</p> <p>11:12:39 17 comprehensive review.</p> <p>11:12:40 18 Q. (By Mr. Chachkes) Okay. Did anybody do a</p> <p>11:12:41 19 comprehensive review?</p> <p>11:12:42 20 A. Well --</p> <p>11:12:45 21 MS. O'DELL: Object to the form.</p> <p>11:12:46 22 THE WITNESS: -- understand -- once again,</p> <p>11:12:48 23 understand that there's a huge body of</p> <p>11:12:53 24 literature and standard methodologies that are</p> <p>11:12:55 25 used for identifying these classes of minerals.</p> <p>Atlanta Reporters, Inc. 866-344-0459 www.atlanta-reporters.com</p>	<p>11:13:56 1 Did anybody at -- it's a yes or no</p> <p>11:13:59 2 question.</p> <p>11:13:59 3 Did anybody at MAS do a comprehensive</p> <p>11:14:01 4 review to determine what I've asked?</p> <p>11:14:05 5 MS. O'DELL: Object --</p> <p>11:14:05 6 THE WITNESS: You'd have to ask Bill</p> <p>11:14:07 7 Longo.</p> <p>11:14:07 8 MS. O'DELL: Excuse me.</p> <p>11:14:08 9 THE WITNESS: You'd have to ask Dr. Longo.</p> <p>11:14:08 10 Q. (By Mr. Chachkes) Okay. Sitting here</p> <p>11:14:09 11 today you don't know?</p> <p>11:14:09 12 MS. O'DELL: Object to form.</p> <p>11:14:09 13 THE WITNESS: He could give you that</p> <p>11:14:14 14 answer.</p> <p>11:14:14 15 Q. (By Mr. Chachkes) Okay. What about</p> <p>11:14:14 16 you --</p> <p>11:14:14 17 THE REPORTER: Wait, wait. You're talking</p> <p>11:14:14 18 at the same time.</p> <p>11:14:14 19 THE WITNESS: Dr. Longo. Sorry.</p> <p>11:14:22 20 Dr. Longo.</p> <p>11:14:22 21 Q. (By Mr. Chachkes) Okay. But you can't</p> <p>11:14:22 22 give me the answer? I have to ask Dr. Longo?</p> <p>11:14:26 23 A. I don't know. That's my answer. Ask</p> <p>11:14:29 24 Dr. Longo.</p> <p>11:14:29 25 Q. Is there a -- so there are SAED axes;</p> <p>Atlanta Reporters, Inc. 866-344-0459 www.atlanta-reporters.com</p>
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<p>11:13:00 1 It's well known.</p> <p>11:13:01 2 You don't have to have -- I mean, you have</p> <p>11:13:04 3 to have an awareness of that there that there</p> <p>11:13:07 4 could be others, but focused in on these types</p> <p>11:13:10 5 of minerals, you know, there's plenty of data to</p> <p>11:13:15 6 be able to make a decision based on looking at</p> <p>11:13:18 7 one plane.</p> <p>11:13:20 8 For instance, chrysotile is a good</p> <p>11:13:22 9 example. You can look at the diffraction</p> <p>11:13:24 10 pattern and see that it's streaked and right</p> <p>11:13:27 11 away know that I possibly have this kind of, you</p> <p>11:13:32 12 know, asbestiform mineral, let me look at the</p> <p>11:13:36 13 morphology, oh, it's rolled up like a scroll.</p> <p>11:13:39 14 That's chrysotile. Oh, when I do the EDS, I've</p> <p>11:13:42 15 got practically a 1-to-1 mag-silicon ratio.</p> <p>11:13:47 16 Wow. You know, 99 percent sure that this is</p> <p>11:13:49 17 chrysotile.</p> <p>11:13:49 18 Q. (By Mr. Chachkes) The original question</p> <p>11:13:51 19 was did anybody at MAS --</p> <p>11:13:52 20 A. I answered that.</p> <p>11:13:53 21 Q. Okay. Let me ask --</p> <p>11:13:54 22 A. Not to cut you off --</p> <p>11:13:54 23 Q. You just did cut me off.</p> <p>11:13:54 24 A. -- but I already answered that.</p> <p>11:13:55 25 Q. Okay. Let me ask again.</p> <p>Atlanta Reporters, Inc. 866-344-0459 www.atlanta-reporters.com</p>	<p>1 correct?</p> <p>11:14:38 2 A. Yes.</p> <p>11:14:38 3 Q. And you can take an SAED image or pattern</p> <p>11:14:44 4 on an axis or off an axis; right?</p> <p>11:14:47 5 A. Uh-huh, yes.</p> <p>11:14:47 6 Q. All right. Is there an off-axis single</p> <p>11:14:53 7 SAED diffraction pattern that is signature-only</p> <p>11:14:57 8 amphiboles?</p> <p>11:14:57 9 A. I would have to review that, but typically</p> <p>11:15:07 10 the answer is if you get -- if you verify the</p> <p>11:15:15 11 spacing, the atomic spacings, at the variance for</p> <p>11:15:19 12 each one of the minerals, one of the -- you know,</p> <p>11:15:23 13 asbestiform minerals -- you know, they're in a group,</p> <p>11:15:26 14 there's a range for actually that spacing too, so --</p> <p>11:15:30 15 but if you come within that spacing, then you most</p> <p>11:15:32 16 likely have an amphibole.</p> <p>11:15:33 17 Q. I wasn't asking you about most likely.</p> <p>11:15:35 18 I'm asking about conclusive, 100 percent, you know</p> <p>11:15:38 19 that's an amphibole.</p> <p>11:15:39 20 MS. O'DELL: Object to the form.</p> <p>11:15:40 21 THE WITNESS: I just told you.</p> <p>11:15:41 22 Q. (By Mr. Chachkes) Okay. You used the</p> <p>11:15:44 23 word most likely. Let me ask you a different way.</p> <p>11:15:47 24 A. What -- I try to answer -- you keep</p> <p>11:15:49 25 breaking these technologies up that we're using to</p> <p>Atlanta Reporters, Inc. 866-344-0459 www.atlanta-reporters.com</p>

11:15:54 **1** verify this, which includes morphology, the shape and
11:15:57 **2** form, which includes the chemistry, the EDS, and the
11:16:01 **3** SAED required in the standard methods, all right.
11:16:04 **4** These are the things. Each one of them by
11:16:08 **5** themselves, no.
11:16:09 **6** **Q.** Okay. I'm only asking questions. I'm not
11:16:12 **7** telling you what your report is consisting of. I'm
11:16:14 **8** not telling you anything. I'm just asking questions.
11:16:16 **9** So if you could just focus on the question --
11:16:19 **10** **A.** I'm trying to focus on it, but you keep
11:16:21 **11** bringing up things that don't go together. All
11:16:24 **12** right. They don't go together for the analysis.
11:16:25 **13** **Q.** Okay. If I were to tell you that a career
11:16:36 **14** academic mineralogist looked at one of your single
11:16:40 **15** axis identifications of an asbestos and said that
11:16:47 **16** SAED diffraction pattern can correspond to many
11:16:52 **17** different minerals, would you have reason to dispute
11:16:55 **18** that?
11:16:55 **19** **A.** No.
11:16:56 **20** MS. O'DELL: Object to the form.
11:16:57 **21** **Q.** (By Mr. Chachkes) Okay. If I brought in
11:16:58 **22** that same mineralogist who said this single axis
11:17:02 **23** diffraction pattern that you have can correspond to
11:17:07 **24** some nonamphibole minerals, do you have -- sitting
11:17:11 **25** here today do you have a reason to dispute that?
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11:17:13 **1** **A.** Yes.
11:17:14 **2** **Q.** Okay. What is that reason?
11:17:14 **3** **A.** Well, I would have to see what the -- what
11:17:18 **4** they were disputing. I'd have to see the data first.
11:17:20 **5** And then I would like to know the qualifications of
11:17:23 **6** this expert and I would like to see what their
11:17:25 **7** quality control is in order to be able to say this
11:17:29 **8** person -- especially in academia, because academia
11:17:32 **9** most of the time doesn't have any kind of quality
11:17:34 **10** control.
11:17:34 **11** So I look a little bit less on their --
11:17:40 **12** you know, they may have been a professor in this for
11:17:42 **13** who knows how long. How long have they worked in the
11:17:45 **14** laboratory? What's their quality control? What have
11:17:48 **15** they done? This is what I want to know.
11:17:50 **16** **Q.** Do you --
11:17:51 **17** **A.** The analysts that we have -- so let me
11:17:53 **18** answer the question.
11:17:54 **19** The analysts we have essentially go
11:17:57 **20** through a process where they are tested by NIST
11:18:02 **21** NVLAP. Think are tested on a quarterly basis on
11:18:05 **22** unknowns that NIST sends to us that we have to
11:18:08 **23** identify, okay.
11:18:10 **24** So what academic professor does that?
11:18:13 **25** None that I know of.
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1 **Q.** Okay.
11:18:14 **2** **A.** So you can bring up all the academic
11:18:17 **3** professors, and I will dispute, you know, a lot of
11:18:19 **4** what they do.
11:18:20 **5** **Q.** Okay. If a supremely complicated --
11:18:27 **6** strike that.
11:18:27 **7** If a supremely qualified mineralogist and
11:18:31 **8** SAED expert were to tell you that one of your single
11:18:34 **9** axis diffraction patterns that you identified as
11:18:37 **10** asbestos can correspond to a nonamphibole -- on a
11:18:43 **11** theoretical basis based on the structure of the
11:18:45 **12** nonamphibole, sitting here today, do you have a
11:18:46 **13** reason to dispute that?
11:18:47 **14** MS. O'DELL: Object to the form.
11:18:49 **15** THE WITNESS: Yes.
11:18:49 **16** **Q.** (By Mr. Chachkes) Okay. What is that?
11:18:50 **17** **A.** I just told you. I'm not going to go
11:18:51 **18** through the answer all over again.
11:18:54 **19** **Q.** Okay. That was all practical. I'm now
11:18:56 **20** talking about theoretical.
11:18:56 **21** **A.** Same for that one, too. Same answer.
11:18:57 **22** **Q.** SAED patterns correspond to the lattice of
11:19:02 **23** a mineral; correct?
11:19:03 **24** **A.** Correct.
11:19:03 **25** **Q.** Is there a nonamphibole that has a lattice
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11:19:09 **1** that could possibly give you a single axis
11:19:13 **2** diffraction pattern that looks like an amphibole?
11:19:17 **3** **A.** I don't know the answer to that because
11:19:20 **4** most of them are -- they have diffraction data for
11:19:24 **5** all these minerals, and there will be slight
11:19:27 **6** differences between them. So, you know, I would have
11:19:29 **7** to look at the data.
11:19:29 **8** **Q.** Okay. Can you identify -- okay, I think I
11:19:33 **9** already asked -- did I already ask you if you can
11:19:35 **10** identify a particle with SAED alone?
11:19:35 **11** **A.** Yeah.
11:19:36 **12** **Q.** Okay. I'm not going to --
11:19:37 **13** **A.** Yep.
11:19:38 **14** **Q.** -- again.
11:19:39 **15** Did I ask whether you can distinguish
11:19:41 **16** anthophyllite from talc --
11:19:42 **17** **A.** Yes.
11:19:42 **18** **Q.** -- SAED alone?
11:19:43 **19** **A.** Yes.
11:19:44 **20** **Q.** Okay. Sorry if I'm --
11:19:46 **21** **A.** That's okay.
11:19:46 **22** **Q.** Oh, I know where I am.
11:19:48 **23** Can you distinguish anthophyllite from
11:19:50 **24** cummingtonite with SAED alone?
11:19:53 **25** **A.** Let's see. The answer to that is
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11:20:00 **1** possibly.
11:20:02 **2** **Q.** When you say possibly, can you be
11:20:04 **3** specific?
11:20:04 **4** **A.** Again, you'd have to do -- you'd have to
11:20:08 **5** do zone axis in a couple of different zones to tell,
11:20:11 **6** and then you probably can say it's most likely. But
11:20:14 **7** again, you'd want to do -- you'd want to do the EDS
11:20:17 **8** and you'd, of course, look at the form of it, too.
11:20:19 **9** **Q.** So how many zone axes would you need if
11:20:22 **10** you only had SAED to rely on to determine whether you
11:20:25 **11** were looking at anthophyllite or cummingtonite?
11:20:28 **12** MS. O'DELL: Object to the form.
11:20:29 **13** THE WITNESS: You could do -- you could
11:20:31 **14** use one. It depends on the pattern that you
11:20:34 **15** see. If it was more of an orthorhombic pattern,
11:20:39 **16** you know, most likely anthophyllite; if it was
11:20:44 **17** more a monoclinic pattern, most likely
11:20:45 **18** cummingtonite.
11:20:45 **19** **Q.** (By Mr. Chachkes) Okay. Let me just show
11:20:45 **20** you what was marked yesterday as Exhibit 15.
11:20:55 **21** Do you have 15? No. Here it is, I'm
11:20:58 **22** sorry. Okay.
11:21:01 **23** I'll represent to you what was -- what's
11:21:05 **24** in Exhibit 15 is pulled from a textbook. Do you
11:21:08 **25** recognize that as an SAED pattern in three axes?
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11:21:10 **1** **A.** Yes.
11:21:11 **2** **Q.** And is there any reason to believe this is
11:21:12 **3** an incorrect three-axes SAED pattern for tremolite?
11:21:16 **4** MS. O'DELL: Object to form.
11:21:17 **5** THE WITNESS: I have no idea on that.
11:21:18 **6** What was this published in; do you know?
11:21:20 **7** **Q.** (By Mr. Chachkes) It's not coming to my
11:21:21 **8** mind right now but --
11:21:22 **9** **A.** I need to know that.
11:21:22 **10** **Q.** Okay.
11:21:23 **11** **A.** Yep. I can't make any decisions on that
11:21:26 **12** unless I know the surrounding stuff here.
11:21:27 **13** **Q.** That's fine.
11:21:28 **14** **A.** Yeah.
11:21:28 **15** **Q.** Sitting here today, any reason to believe
11:21:30 **16** this is incorrect?
11:21:31 **17** MS. O'DELL: Object to the form.
11:21:33 **18** THE WITNESS: Again --
11:21:34 **19** MS. O'DELL: He's answered your question.
11:21:36 **20** THE WITNESS: Yep. It's hard to tell
11:21:38 **21** without, you know, knowing where this is from.
11:21:42 **22** **Q.** (By Mr. Chachkes) Okay. Is it your
11:21:44 **23** understanding that tremolite can have different SAED
11:21:48 **24** patterns in the three different axes?
11:21:52 **25** **A.** Again, it could. But once again, when you
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11:21:55 **1** measured that, when you measure out for each one of
11:21:57 **2** the sets or wherever it would be, there are
11:21:59 **3** parameters -- lattice parameters in each one of those
11:22:03 **4** zones, and that would still be tremolite.
11:22:04 **5** **Q.** Okay. If --
11:22:06 **6** **A.** It would still be tremolite.
11:22:07 **7** **Q.** Okay.
11:22:08 **8** **A.** Okay.
11:22:08 **9** **Q.** Are you done?
11:22:09 **10** **A.** Yeah.
11:22:09 **11** **Q.** Okay. If you had an SAED pattern for a
11:22:11 **12** mineral in three separate axes and each one was
11:22:14 **13** exactly the same, could it possibly be tremolite?
11:22:17 **14** MS. O'DELL: Object to the form.
11:22:18 **15** THE WITNESS: I don't know.
11:22:18 **16** **Q.** (By Mr. Chachkes) Wouldn't that mean it
11:22:20 **17** was a symmetric lattice and that tremolite doesn't
11:22:24 **18** have a symmetric lattice?
11:22:27 **19** **A.** Again, I don't know how to answer that
11:22:28 **20** question.
11:22:29 **21** **Q.** Are you aware of what the lattice of
11:22:30 **22** tremolite looks like?
11:22:31 **23** **A.** Yes. I am. It is monoclinic.
11:22:35 **24** **Q.** Okay. Is it perfectly symmetrical in the
11:22:38 **25** X, Y, and Z axes?
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11:22:40 **1** **A.** I don't know. I'd have to look at it.
11:22:42 **2** **Q.** Okay. We can take a break now, if you
11:22:51 **3** like.
11:22:51 **4** **A.** Do you need a break?
11:22:52 **5** **Q.** Yeah.
11:22:54 **6** **A.** Sure.
11:22:54 **7** (Recess from 11:22 a.m. to 11:42 a.m.)
11:42:33 **8** **Q.** (By Mr. Chachkes) Would you agree with
11:42:52 **9** the statement that the more complete the SAED pattern
11:42:56 **10** an analyst obtains, the more likely the analyst is to
11:43:00 **11** make an accurate determination of the crystal
11:43:02 **12** structure?
11:43:03 **13** **A.** I don't know what you mean by complete.
11:43:08 **14** Aside from the definition of the SAED pattern,
11:43:16 **15** sometimes they can be faint; they can be light. So
11:43:21 **16** the more defined the pattern is, I would say that
11:43:24 **17** helps.
11:43:24 **18** **Q.** Okay. When you say defined, you mean the
11:43:26 **19** kind of the -- when you say faint and light, that's
11:43:31 **20** just a matter of how dark the dot is?
11:43:32 **21** **A.** Yeah, well, the diffraction pattern
11:43:34 **22** sometimes can be very -- it can be very faint, so,
11:43:38 **23** you know, it just depends. So the more defined the
11:43:43 **24** pattern is, the better.
11:43:43 **25** **Q.** What about the more focused the pattern,
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11:43:46 **1** the better?
11:43:47 **2** **A.** Again, the pattern is usually going to be
11:43:52 **3** focused properly -- when the microscope is set up
11:43:55 **4** properly, you're going to get a good defined pattern.
11:43:58 **5** So it's mainly the ability to see all the spots there
11:44:04 **6** associated with that particular zone.
11:44:06 **7** **Q.** If you get a SAED pattern where the dots
11:44:09 **8** are unfocused, can that hamper the ability to
11:44:14 **9** identify the crystal?
11:44:15 **10** MS. O'DELL: Object to the form.
11:44:16 **11** THE WITNESS: The answer to that is no.
11:44:18 **12** Sometimes we see patterns that are smeared or
11:44:21 **13** diffuse. Again, chrysotile is a good example of
11:44:23 **14** that.
11:44:24 **15** But if you see a very diffuse pattern,
11:44:28 **16** then you may have what's more like an amorphous,
11:44:31 **17** not a very crystalline material, and you'll see
11:44:34 **18** that in rings.
11:44:35 **19** **Q.** (By Mr. Chachkes) Are there instances
11:44:36 **20** where you are unable to obtain a clear SAED pattern
11:44:40 **21** so your data in that scenario is inconclusive?
11:44:44 **22** MS. O'DELL: Object to the form.
11:44:45 **23** THE WITNESS: You will work to get the
11:44:51 **24** best pattern that you can out of the structure
11:44:52 **25** that you have, so the answer to that is you
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11:44:54 **1** won't use a pattern that's not acceptable.
11:44:57 **2** **Q.** (By Mr. Chachkes) Right. The question
11:44:58 **3** isn't about -- so the question is -- let me ask a
11:45:01 **4** different question.
11:45:01 **5** **A.** Okay.
11:45:02 **6** **Q.** In doing the MDL samples, did you ever run
11:45:04 **7** across a case where you were unable to obtain a clear
11:45:09 **8** SAED pattern and so the SAED was inconclusive?
11:45:12 **9** MS. O'DELL: Object to the form.
11:45:13 **10** THE WITNESS: I don't know of any, no.
11:45:14 **11** **Q.** (By Mr. Chachkes) Analysts can use the
11:45:18 **12** information obtained from SAED to make distinctions
11:45:22 **13** in the crystal system of the lattice, for example,
11:45:27 **14** whether it's triclinic, monoclinic, cubic, or
11:45:30 **15** orthorhombic?
11:45:33 **16** **A.** Yes.
11:45:33 **17** **Q.** Okay. Sorry.
11:45:37 **18** **A.** I paused.
11:45:38 **19** **Q.** Yes.
11:45:50 **20** Describe how you or your analysts
11:45:53 **21** calibrate the SAED apparatus.
11:45:56 **22** **A.** The electron diffraction? Again, I'm not
11:45:59 **23** an expert in that particular area, but what they
11:46:02 **24** typically do is they'll do a sizing based on gold, a
11:46:08 **25** film of gold, and from that they will make
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11:46:12 **1** calculations on what the gold lattice parameters are,
11:46:17 **2** and then they will compare that to the unknown using
11:46:21 **3** that particular configuration.
11:46:23 **4** **Q.** Okay. Sometimes you say diffraction
11:46:27 **5** pattern, and just to be clear --
11:46:29 **6** **A.** Sure.
11:46:29 **7** **Q.** -- diffraction pattern, you're being
11:46:32 **8** synonymous with SAED?
11:46:34 **9** **A.** Yes.
11:46:34 **10** **Q.** And how do your analysts determine when
11:46:38 **11** it's appropriate to take multiple axes for a single
11:46:42 **12** sample under SAED?
11:46:43 **13** **A.** That's a good question. Typically we'll
11:46:46 **14** do that for anthophyllite to verify that it is
11:46:50 **15** anthophyllite. We'll take multiples on that.
11:46:52 **16** It's not required in the standard method
11:46:55 **17** to do that because typically you can do it in one
11:46:58 **18** zone for the amphiboles. But to show that it's not
11:47:04 **19** fibrous talc versus anthophyllite, you're essentially
11:47:08 **20** going to take another one to verify it.
11:47:10 **21** **Q.** Okay. For tremolite, you take one axis?
11:47:12 **22** **A.** Yes, you can.
11:47:13 **23** **Q.** Okay. Not what -- I'm not asking about
11:47:15 **24** what you can do. So let me put it --
11:47:17 **25** **A.** Yes.
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11:47:18 **1** **Q.** Okay.
11:47:18 **2** **A.** The answer's yes.
11:47:19 **3** **Q.** Okay. There are no SAED patterns that you
11:47:23 **4** created for the MDL samples that weren't produced;
11:47:23 **5** correct?
11:47:25 **6** **A.** Correct.
11:47:26 **7** **Q.** And I'm seeing one SAED pattern for the
11:47:29 **8** tremolite, meaning can I conclude that you've only
11:47:32 **9** taken one SAED pattern for the tremolites?
11:47:34 **10** **A.** I would say yes to that.
11:47:35 **11** **Q.** Okay. And I'm seeing two SAED patterns
11:47:39 **12** for anthophyllite. Is it okay for me to conclude
11:47:41 **13** that you take only two patterns for anthophyllite?
11:47:45 **14** **A.** Most likely yes, because again, we want to
11:47:48 **15** be able to distinguish that from fibrous talc.
11:47:52 **16** **Q.** Let's look at another exhibit. What
11:48:00 **17** number is that? Is that like 16? Let's look at 16.
11:48:08 **18** **A.** Okay.
11:48:08 **19** **Q.** Do you recognize what's been marked as
11:48:10 **20** Longo Exhibit 16?
11:48:13 **21** **A.** Yes.
11:48:13 **22** **Q.** What's a diffraction verification?
11:48:17 **23** **A.** These are diffractions that have been done
11:48:21 **24** on a sample that's already been analyzed, and what
11:48:24 **25** the analyst does is they go back in and they verify
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11:48:27 **1** the diffraction pattern. They verify that it is, in
11:48:31 **2** fact, whatever it was called before.
11:48:33 **3** Q. Yeah, I see that -- do you see the date
11:48:37 **4** verified down there in the lower left?
11:48:39 **5** A. Which one are we looking at? Page 1?
11:48:40 **6** Q. Let's look at the first page of that --
7 A. Okay.
11:48:42 **8** Q. -- that you actually see a verification.
11:48:44 **9** Most if not all of the verifications are after the
11:48:47 **10** date of your first report; is that correct?
11:48:51 **11** MS. O'DELL: At least on this page?
12 THE WITNESS: Yeah.
11:48:53 **13** MR. CHACHKES: Well, it's a question.
11:48:54 **14** THE WITNESS: I would think -- what's the
11:48:55 **15** question again?
11:48:56 **16** Q. (By Mr. Chachkes) The question is were
11:48:56 **17** most if not all of your verifications for the MDL
11:48:59 **18** samples done after the date of your first report,
11:49:02 **19** which was October 14?
11:49:03 **20** A. I don't know. I'd have to look at these
11:49:05 **21** and compare that to that date.
11:49:06 **22** Q. Okay. This verification, for example, was
11:49:13 **23** done after the date of your first report; correct?
11:49:16 **24** A. Yes.
11:49:16 **25** Q. Okay. And you're --
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11:49:18 **1** A. Are you talking about the November report?
11:49:19 **2** Q. November 14 --
11:49:20 **3** A. Yes.
11:49:20 **4** Q. -- I'm saying that's the first report.
11:49:21 **5** A. Sure.
11:49:22 **6** Q. So at the very least, you had already
11:49:25 **7** determined by October 14 that this sample on the
11:49:29 **8** first page corresponded to anthophyllite before you
11:49:37 **9** had done the verification; correct?
11:49:44 **10** A. Well, the answer to that is yes, we
11:49:46 **11** already had determined it was anthophyllite.
11:49:47 **12** Q. Okay. And so the verification's, what,
11:49:49 **13** kind of a belt and suspenders?
11:49:51 **14** A. Sure.
11:49:51 **15** MS. O'DELL: Object to the form.
11:49:52 **16** THE WITNESS: Well, I mean, it's a
11:49:54 **17** follow-up.
11:49:54 **18** Q. (By Mr. Chachkes) Okay. And I see that
11:49:58 **19** there's a range in the table of amphibole types up
11:50:02 **20** there at the top; do you see that?
11:50:04 **21** A. Yes.
11:50:04 **22** Q. What does the range column mean?
11:50:07 **23** A. That is the actual atomic spacing for that
11:50:11 **24** lattice parameter. And, for instance, if you take
11:50:15 **25** grunerite at the beginning there, you'll see it's
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11:50:18 **1** 4.94 to 5.46. So within that range, if your spacing
11:50:23 **2** falls within that range, it could be grunerite.
11:50:28 **3** Q. Now, for this verification page, you
11:50:34 **4** calculated a d-spacing of 5.23; correct?
11:50:38 **5** A. Correct.
11:50:38 **6** Q. And that falls within the range of every
11:50:40 **7** single amphibole on that list; right?
11:50:43 **8** A. Correct.
11:50:43 **9** Q. How was it that this verifies that this is
11:50:46 **10** anthophyllite when it falls within the range of every
11:50:48 **11** amphibole in your list?
11:50:49 **12** A. Well, again, this is not -- this is an
11:50:52 **13** incomplete. We have to look at the EDS, and we also
11:50:56 **14** have to look at the form again. So with that
11:50:59 **15** standard methodology, then we can come to a
11:51:02 **16** conclusion that it is anthophyllite.
11:51:03 **17** So it's not done in a vacuum, if you will.
11:51:05 **18** The only thing that's done in a vacuum is putting the
11:51:08 **19** sample into the electron microscope.
11:51:10 **20** But that is true, and you will see that
11:51:13 **21** for these lattice parameters.
11:51:18 **22** Q. Okay. For this sample that we're looking
11:51:22 **23** at, the d-spacing indeed corresponds to grunerite,
11:51:24 **24** actinolite, tremolite, crocidolite, and
11:51:27 **25** anthophyllite; correct?
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11:51:27 **1** MS. O'DELL: Object to the form.
11:51:28 **2** THE WITNESS: Well, I mean, it's within
11:51:29 **3** the range there. Again, this is why you can't
11:51:32 **4** just use the one method to say, oh, I'm going to
11:51:35 **5** use SAED and say that it is anthophyllite.
11:51:38 **6** You've got to go look at the form of it;
11:51:40 **7** you've got to go do the EDS to prove that it is.
11:51:44 **8** So yeah.
11:51:47 **9** Q. (By Mr. Chachkes) Yeah, you would not use
11:51:48 **10** EDS d-spacing alone to determine the mineral you're
11:51:53 **11** looking at because it falls under too many different
11:51:55 **12** minerals; correct?
11:51:55 **13** MS. O'DELL: Object to the form.
11:51:56 **14** THE WITNESS: It tells you that it is an
11:51:58 **15** amphibole, that it is in that range. And again,
11:52:00 **16** we do -- let's see. There should be another one
11:52:03 **17** here of the same one. Let's see.
11:52:10 **18** Number 301 01. If you go to the next
11:52:12 **19** page, you'll see this is the same structure
11:52:14 **20** again, same structure again, the second
11:52:17 **21** verification. Down here you'll see the zone, it
11:52:20 **22** was a 101, and the d-spacing for that zone are
11:52:25 **23** shown there for each one of the angles -- you
11:52:27 **24** know, each one of the lattice parameters, and
11:52:30 **25** this verifies it as anthophyllite if you were
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11:52:34 **1** looking at the table, the spacing table. So
11:52:37 **2** then we look at the EDS, the EDS confirms again
11:52:40 **3** the chemistry. So, you know, it's dead to right
11:52:45 **4** anthophyllite.
11:52:46 **5 Q.** (By Mr. Chachkes) So you're just looking
11:52:47 **6** at -- so I see the spacing here is 21.2?
11:52:50 **7 A. Right. Now that's in -- this zone is 101**
11:52:54 **8 zone.**
11:52:55 **9 Q.** Okay.
11:52:56 **10 A. Okay. That is what it would be in the 101**
11:52:58 **11 zone.**
11:52:58 **12 Q.** And you don't have ranges for the 101
11:53:01 **13** zone, do you?
11:53:02 **14 A. Well, there are tables for the ranges in**
11:53:03 **15 the 101 zone. We don't have one right here --**
11:53:07 **16 Q.** Okay.
11:53:07 **17 A. -- but there are table ranges for that.**
11:53:09 **18 Q.** When you say -- so for this table on the
11:53:12 **19** second page of -- the second verification, are you
11:53:16 **20** looking at the 5.05 down at the bottom?
11:53:19 **21 A. Yes.**
11:53:19 **22 Q.** Okay. That 5.05 falls within every single
11:53:23 **23** amphibole type in your table as well?
11:53:26 **24 A. No, no. It's a combination of the HKO,**
11:53:29 **25 the HKL, the zone that you're in what the angle is.**
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11:53:32 **1 There are tables for these. You know what I'm**
11:53:35 **2 saying? We had talked about that a little bit**
11:53:37 **3 before. There are tables for these. And in each one**
11:53:41 **4 of the zones there are spacings, spacing tables, and**
11:53:45 **5 these fit in the anthophyllite zone.**
11:53:48 **6 Q.** When you say these, do you mean the 101
11:53:51 **7** spacing of 21.2?
11:53:52 **8 A. Well, yes.**
11:53:53 **9 Q.** Okay. And that table's not reproduced in
11:53:55 **10** this page; correct?
11:53:56 **11 A. No, it's not here.**
11:53:57 **12 Q.** So in the peer-reviewed literature I would
11:53:59 **13** find that a 101 zone spacing of 21.2 will correspond
11:54:09 **14** uniquely to anthophyllite?
11:54:09 **15 A. The answer to that is yes.**
11:54:11 **16 Q.** Okay. Can you tell me what peer-reviewed
11:54:13 **17** literature?
11:54:13 **18 A. Let's see. There's a large body of card**
11:54:19 **19 data, diffraction card data, and again, there are**
11:54:22 **20 zone tables in that data, and that's where it comes**
11:54:25 **21 from. That's why we do the -- that's why we do the**
11:54:29 **22 double verification on anthophyllite, you know,**
11:54:30 **23 because it doesn't fit with talc.**
11:54:33 **24 Q.** Can you tell me conclusively whether there
11:54:38 **25** are other minerals that in the zone 101 have spacing
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11:54:47 **1** of 21.2 in that range?
11:54:49 **2 A. I can't tell you that as I sit here.**
11:54:51 **3 Q.** Okay. Does the verification -- have you
11:55:04 **4** ever done a verification and the spacing fell outside
11:55:07 **5** the range of what you had already identified?
11:55:09 **6 A. I don't know the answer to that.**
11:55:10 **7 Q.** Did that happen for the MDL at all? You
11:55:13 **8** just don't know?
11:55:14 **9 A. I don't know.**
11:55:14 **10** MS. O'DELL: Object to the form.
11:55:15 **11** THE WITNESS: Yeah, I don't know.
11:55:16 **12 Q.** (By Mr. Chachkes) If it happened, you
11:55:18 **13** would have reported it; right?
11:55:19 **14 A. Well, yes. I would think so, yes.**
11:55:21 **15 Q.** Did you do any of these d-spacing
11:55:30 **16** verifications prior to the first draft, the
11:55:33 **17** November 14 version of your report?
11:55:35 **18 A. I --**
11:55:36 **19** MS. O'DELL: Feel free to look through it
11:55:37 **20** if you need to. Look at the dates.
11:55:39 **21** THE WITNESS: Let's see what we've got
11:55:40 **22** here. Yeah, it looks like a few. Some of them
11:55:47 **23** were here. Get towards the back. They were
11:55:49 **24** done in October.
11:55:52 **25** It looks like about half of them; half of
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11:55:54 **1** them were done before that first report.
11:55:56 **2 Q.** (By Mr. Chachkes) Can I conclude because
11:56:00 **3** some were done after and some were done before the
11:56:02 **4** first report, it wasn't material to your findings in
11:56:05 **5** the first report?
11:56:07 **6** MS. O'DELL: Object to the form.
11:56:10 **7** THE WITNESS: Are you saying the ones that
11:56:12 **8** are after that are not material? What's the
11:56:14 **9** question?
11:56:15 **10 Q.** (By Mr. Chachkes) No.
11:56:15 **11** So clearly before -- at the time of your
11:56:18 **12** first report there were MDL samples on which you had
11:56:23 **13** not done a d-spacing verification; correct?
11:56:25 **14 A. No, we did the verification. I mean, we**
11:56:28 **15 did -- I mean, you have to understand it was called**
11:56:31 **16 at the time based on the data that we had for that**
11:56:38 **17 pattern, that chemistry, that morphology.**
11:56:40 **18 So again, I would say that they all have**
11:56:46 **19 been verified prior to that.**
11:56:47 **20 Q.** Okay. So I want to make sure we're clear
11:56:50 **21** here.
11:56:50 **22 A. Sure.**
11:56:51 **23 Q.** So going back to the first verification, I
11:56:54 **24** see -- it says date verified November 19; correct?
11:56:57 **25 A. Yes.**
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11:56:57 **1 Q.** You're saying there was another
11:56:59 **2** verification prior to November 14?
11:57:01 **3 A. Sure.**
4 Q. And you did --
11:57:01 **5 A. The actual analysis, when it was actually**
11:57:03 **6 done.**
11:57:03 **7 MR. CHACHKES:** Okay. So we would actually
11:57:06 **8** request that that other data be produced.
11:57:08 **9 MS. O'DELL:** It's been produced.
11:57:09 **10 THE WITNESS:** You already have it. It's
11:57:10 **11** all in the reports.
11:57:11 **12 Q.** (By Mr. Chachkes) Okay.
11:57:12 **13 A. Yeah.**
11:57:12 **14 Q.** So was there a -- why did you redo it on
11:57:16 **15** 11/19?
11:57:17 **16 A. It's just part of our quality control. We**
11:57:20 **17 eventually have to do it as part of quality.**
11:57:22 **18 Q.** So every single d-spacing that you did,
11:57:25 **19** you did twice?
11:57:26 **20 A. If it was anthophyllite, yeah.**
11:57:28 **21 Q.** Okay. So the tremolites were all done --
11:57:34 **22** so let me just -- I'm looking at a page for tremolite
11:57:37 **23** where the verification is 11/19.
11:57:41 **24 A. Okay. I mean, we've got anthophyllites**
11:57:45 **25 that were double-verified before that report also**
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11:57:48 **1 that was on 10/31/2018.**
11:57:51 **2 Q.** Right.
11:57:51 **3 A. There are a number of them here in the**
11:57:53 **4 report.**
11:57:53 **5 Q.** So --
11:57:54 **6 A. Numerous.**
11:57:55 **7 Q.** You're saying some of the tremolites were
11:57:57 **8** double-verified?
11:57:58 **9 MS. O'DELL:** Object to the form.
11:57:59 **10 THE WITNESS:** No, I don't think the
11:58:00 **11** tremolites were. The anthophyllites are.
11:58:03 **12 Q.** (By Mr. Chachkes) Okay.
13 A. Yes.
11:58:03 **14 Q.** I can show you. I just don't have the
11:58:04 **15** page numbers.
11:58:05 **16 A. Okay.**
11:58:05 **17 Q.** If you look at that one --
18 A. All right.
11:58:07 **19 Q.** -- in the exhibit --
11:58:09 **20 MS. O'DELL:** So let's be clear on the
11:58:10 **21** record. Is there a sample number --
22 Q. (By Mr. Chachkes) You say the sample
11:58:12 **23** number. What's the sample number for that one?
11:58:13 **24 A. M68503-020-002.**
11:58:20 **25 Q.** And that was the tremolite; correct?
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11:58:22 **1 A. That was a tremolite, yes.**
11:58:23 **2 Q.** And it was verified after the date of the
11:58:25 **3** first report; correct?
11:58:26 **4 A. 11/19/2018. What is the date of the first**
11:58:31 **5 report?**
11:58:33 **6 MS. O'DELL:** 11/14.
11:58:33 **7 Q.** (By Mr. Chachkes) 11/14.
11:58:34 **8 A. 14. Okay. Yeah.**
11:58:34 **9 Q.** So that was verified after the date of the
11:58:37 **10** first report; correct?
11:58:38 **11 A. Uh-huh.**
11:58:38 **12 Q.** That means that as of the date of the
11:58:40 **13** first report it had not been verified?
11:58:41 **14 MS. O'DELL:** Objection to form.
11:58:43 **15 MS. PARFITT:** Objection.
11:58:44 **16 THE WITNESS:** Well, let's back up just a
11:58:45 **17** second. The actual date of the photo, okay, the
11:58:48 **18** diffraction photo, was 10/26/2018, okay. So it
11:58:52 **19** actually was done before that.
11:58:54 **20 Q.** (By Mr. Chachkes) The photo was taken --
11:58:55 **21 A. The photo was taken, okay, and that's the**
11:58:58 **22 data. The photo is the data. So regardless of this**
11:59:02 **23 right here, all right, that is the pattern, and**
11:59:06 **24 that's what it was.**
11:59:10 **25 Q.** You know what I'm talking about; right?
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1 A. Yeah, I know what you mean.
2 Q. The actual --
3 A. I get that.
11:59:13 **4 MS. O'DELL:** Let him finish.
11:59:13 **5 Q.** (By Mr. Chachkes) Let me just finish.
6 A. Okay.
11:59:14 **7 Q.** Taking the photo and turning it into
11:59:16 **8** useful data in a verification that gives you
11:59:17 **9** d-spacing, you didn't do that until after the report?
11:59:19 **10 MS. O'DELL:** Object to form.
11:59:20 **11 THE WITNESS:** Well, again, I would have to
11:59:21 **12** consult with the laboratory to see, you know,
11:59:25 **13** what actually was done here. But the data
11:59:27 **14** existed before the report was done.
11:59:28 **15 Q.** (By Mr. Chachkes) That's not my question.
11:59:29 **16 A. I understand that. But understand that it**
11:59:33 **17 was already verified prior to that or wouldn't have**
11:59:35 **18 ended up in the report as tremolite.**
11:59:37 **19 Q.** Was it verified with d-spacing prior to
11:59:39 **20** the report at 11/14?
11:59:41 **21 A. I would have to check on that, but to my**
11:59:43 **22 knowledge, it would be, yeah.**
11:59:44 **23 Q.** Okay. So this would be a second d-spacing
11:59:47 **24** calculation that you did for the tremolite?
11:59:49 **25 MS. O'DELL:** Object to the form.
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11:59:50 **1** THE WITNESS: Yes.
11:59:50 **2 Q.** (By Mr. Chachkes) Okay.
11:59:52 **3 A. Yes.**
11:59:52 **4 Q.** When you did the first one -- strike that.
11:59:58 **5 A. Okay.**
11:59:58 **6 Q.** D-spacing's important to determining
12:00:03 **7** whether you're accurately identifying a mineral using
12:00:08 **8** diffraction patterns?
12:00:11 **9** MS. O'DELL: Objection to form.
12:00:12 **10** THE WITNESS: It's part of the standard
12:00:13 **11** methodology.
12:00:14 **12 Q.** (By Mr. Chachkes) Is it an important
12:00:15 **13** part?
12:00:15 **14** MS. O'DELL: Objection to form.
12:00:16 **15** THE WITNESS: Well, I would think that if
12:00:17 **16** you wanted the answer that, again, is it part of
12:00:22 **17** the methodology, a lot of standards use that, so
12:00:25 **18** yes.
12:00:26 **19 Q.** (By Mr. Chachkes) Okay. Your methodology
12:00:29 **20** of -- that you've described today for how you did
12:00:33 **21** SAED -- strike that.
12:00:37 **22 A. Good.**
12:00:37 **23 Q.** Let's look at a specific section from your
12:00:44 **24** report. And so you -- yes.
12:00:53 **25** This is sample M68503-208 -- go slow
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12:01:00 **1** here -- -028. Sorry. It's page 585 of the version
12:01:07 **2** of the January 15 report that was produced to us.
12:01:12 **3** And plaintiffs' counsel --
12:01:13 **4** MS. O'DELL: I didn't catch that number.
12:01:15 **5** Excuse me. What was it?
12:01:16 **6** MR. CHACHKES: It was M68503-028.
12:01:23 **7** MS. O'DELL: What's the page of the
12:01:27 **8** report?
12:01:27 **9** MR. CHACHKES: 585 of the version produced
12:01:27 **10** to us. And you brought us versions separated by
12:01:27 **11** decades, so you can find it in the 1970s
12:01:30 **12** notebook. Okay.
12:01:36 **13 Q.** (By Mr. Chachkes) And let's mark this as
12:01:38 **14** a separate exhibit just so you can have it in front
12:01:40 **15** of you without a huge binder.
12:01:40 **16** MS. O'DELL: It's --
12:01:44 **17** MR. CHACHKES: You want to do it in the
12:01:46 **18** binder? That's fine. If you can locate it, I
12:01:50 **19** don't care.
12:01:50 **20** MS. O'DELL: I just don't want -- if he
12:01:51 **21** needs to look at any other data, I want it to be
12:01:54 **22** available to him. You're welcome to hand him
12:01:55 **23** the exhibit, but I want to find it as well.
12:01:56 **24** MR. CHACHKES: If you're going to find it,
12:01:57 **25** it's just easy enough to do it that way.
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12:02:05 **1** MS. O'DELL: And it's M68503-028?
12:02:10 **2** MR. CHACHKES: -028, correct.
12:02:17 **3** THE WITNESS: What's the decade?
12:02:19 **4 Q.** (By Mr. Chachkes) I'm told the '70s.
12:02:38 **5 A. Let's see what it says here -- 03 --**
12:02:38 **6** MS. O'DELL: Is that it?
12:02:39 **7** THE WITNESS: Should be section 8 -- you
12:02:41 **8** said 028? It should be section -- well, it's
12:02:44 **9** section 8 in ours. I'm not sure what it is in
12:02:47 **10** here.
12:02:50 **11** MS. O'DELL: Here we go.
12:02:51 **12** THE WITNESS: Section 8. Okay. There we
12:03:07 **13** go.
12:03:08 **14 Q.** (By Mr. Chachkes) Okay. Are you there?
12:03:11 **15 A. Yes.**
12:03:11 **16 Q.** Okay. So it's anthophyllite, so you would
12:03:13 **17** expect two diffraction patterns; correct? Can you
12:03:19 **18** see two diffraction patterns?
12:03:21 **19 A. In this, there may be just one here.**
12:03:24 **20 There may be two on the verification, but let's see**
12:03:26 **21 if there is. Let's see.**
12:03:31 **22 41391. Yes. There's two of them.**
12:03:32 **23 Q.** Why did you say there may be just one?
12:03:34 **24 A. Oh, well, I was thinking the -- I was**
12:03:37 **25 thinking anything else but anthophyllite. But**
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12:03:40 **1 they're both here.**
12:03:41 **2 Q.** So for anthophyllite you always expect two
12:03:43 **3** patterns in your report; correct?
12:03:45 **4 A. There should be, yes.**
12:03:45 **5 Q.** Okay. Now, looking at these diffraction
12:03:49 **6** patterns, is there -- for this single sample that
12:03:54 **7** we're looking at, can you use just those diffraction
12:03:58 **8** patterns to tell whether or not it's cummingtonite as
12:04:05 **9** an option?
12:04:06 **10** MS. O'DELL: Object to the form.
12:04:21 **11** THE WITNESS: What's the question again?
12:04:23 **12 Q.** (By Mr. Chachkes) So can you tell from
12:04:25 **13** the two diffraction patterns that you have for sample
12:04:28 **14** M68503-028 whether this is anthophyllite versus
12:04:35 **15** cummingtonite, just focusing on the diffraction
12:04:37 **16** patterns?
12:04:38 **17 A. No.**
12:04:38 **18 Q.** And why not?
12:04:39 **19 A. Well, they can have a similar diffraction**
12:04:42 **20 pattern if this looks like -- this looks like an**
12:04:47 **21 orthorhombic pattern, just looking at it. So the**
12:04:54 **22 cummingtonite is going to have more of a monoclinic**
12:04:56 **23 pattern.**
12:04:56 **24 Q.** But you answered no. Why did you answer
12:04:58 **25** no?
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12:05:00 **1 A. What --**
12:05:01 **2 Q.** You said no to my question.
12:05:02 **3 A. What was the question again?**
12:05:06 **4 Q.** Can you tell whether -- from just the EDS
12:05:07 **5** patterns whether this is cummingtonite or
12:05:07 **6** anthophyllite?
12:05:07 **7 A. Well, again, the answer is still no.**
12:05:16 **8 Q.** I'm sorry, let me ask the question again
12:05:18 **9** because I'm told by my associate that I misspoke.
12:05:23 **10** Can you tell from the diffraction patterns
12:05:28 **11** alone for sample M68503-028 whether this is
12:05:37 **12** anthophyllite or cummingtonite?
12:05:39 **13 A. I think I just answered that twice.**
12:05:41 **14 Q.** Okay. And the answer was no?
12:05:42 **15 A. Yeah. I mean, it appears to be an**
12:05:44 **16 orthorhombic pattern.**
12:05:47 **17 Q.** Okay. What is the definition of
12:05:53 **18** asbestiform?
12:05:54 **19 A. Well, it actually means asbestos-like,**
12:05:59 **20 that's what the word means, like asbestos.**
12:06:01 **21 Q.** So what is asbestos?
12:06:03 **22 A. Well, the classic definition of**
12:06:09 **23** asbestiform would be a structure that is 1/2 a micron
12:06:13 **24** in size with substantially parallel sides. Some
12:06:18 **25** literature adds the stipulations of tensile strength
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12:06:24 **1 and all of that kind of thing, and most of them,**
12:06:27 **2 those definitions, are sort of on a geological macro**
12:06:31 **3 scale. That's what they're meant to describe.**
12:06:33 **4 Q.** Okay. For your purposes, when you use the
12:06:35 **5** word asbestos or asbestiform in your report, you're
12:06:38 **6** saying -- are you saying anything more than 1/2 a
12:06:42 **7** micron in size, substantially parallel sides?
12:06:45 **8 A. Yes. I mean, it's a regulated definition.**
12:06:51 **9 Q.** Yeah, but what I'm asking is if -- is
12:06:54 **10** there any other qualification in your definition when
12:06:57 **11** you use the phrase -- the words asbestiform or
12:07:00 **12** asbestos in your report?
12:07:01 **13 A. Well, we're going by the -- again, by the**
12:07:04 **14 classic definition of what I just described. Then**
12:07:09 **15 you go in and you do the diffraction, the EDS, and**
12:07:13 **16 the form of it of course -- you know, and then you**
12:07:16 **17 make a decision on that. But as far as, you know,**
12:07:18 **18 using that term, you know, it's mainly based on that**
12:07:22 **19 definition.**
12:07:23 **20 Q.** Substantially parallel sides, 1/2 a
12:07:26 **21** micron?
12:07:26 **22 A. 1/2 a micron, yeah, yeah.**
12:07:29 **23 Q.** Okay. What about aspect ratio, is that
12:07:30 **24** part of your definition?
12:07:31 **25 A. Well, again, it depends on the -- some of**
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12:07:36 **1 the standards that you look at, the aspect ratio**
12:07:41 **2 is -- if you're talking OSHA, the aspect ratio is**
12:07:44 **3 3-to-1. If you're talking AHERA, EPA, the aspect**
12:07:48 **4 ratio is 5-to-1. If you're talking ISO, the ratio is**
12:07:53 **5 5-to-1. If you're talking ASTM, the ratio is 5-to-1.**
12:07:57 **6 So we go by 5-to-1, yeah.**
12:07:59 **7 Q.** Am I correct in concluding that every time
12:08:04 **8** in your expert report you use the word asbestos or
12:08:06 **9** asbestiform, you're -- among the other qualifications
12:08:11 **10** you said it's got at least a 5-to-1 ratio?
12:08:13 **11 A. It should, yes.**
12:08:14 **12 Q.** Okay. What about at least a 3-to-1 ratio?
12:08:16 **13 A. And again, that's an OSHA. We're looking**
12:08:20 **14 at 5-to-1. OSHA will call it at that. They will**
12:08:25 **15 call it asbestos at that ratio.**
12:08:29 **16 So but in all of our reporting we're at**
12:08:33 **17 5-to-1. So we do see 3-to-1 structures, and as far**
12:08:39 **18 as the body's concerned, it's going to treat the**
12:08:41 **19 3-to-1 to 5-to-1 probably in the same manner. So**
12:08:46 **20 I've always testified that way. The structures that**
12:08:49 **21 it encounters, regardless of the aspect ratio, have**
12:08:53 **22 to be dealt with in the body.**
12:08:54 **23 Q.** For the purposes of your report, did you
12:08:56 **24** count a 3-to-1 as a fiber, an asbestos fiber?
12:08:59 **25 A. Not that I'm aware of.**
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12:09:02 **1 Q.** Okay. Let me show you some testimony from
12:09:06 **2** Dr. Longo from -- oh. Well, no, let's do this.
12:09:17 **3** Can we mark this as the next exhibit.
12:09:37 **4** (Defendants' Exhibit 2 was marked for
12:09:37 **5** identification.)
12:09:37 **6 Q.** (By Mr. Chachkes) Okay. Can you turn to
12:09:44 **7** page 3021. This is the deposition -- this is an
12:09:51 **8** examination of Dr. Longo under oath.
12:09:55 **9** Can you turn to page 3021? It's the very
12:09:59 **10** last sheet. I'm going to read you a question and
12:10:01 **11** answer. You can following along. It starts at
12:10:04 **12** line 4.
12:10:05 **13** Line 4, My question to you, Dr. Longo, is
12:10:07 **14** that transmission electron microscopy cannot tell you
12:10:11 **15** if you identify a single fiber whether or not that
12:10:14 **16** particle is asbestiform or nonasbestiform; correct?
12:10:18 **17** Answer: That is correct.
12:10:21 **18** Do you agree with that testimony?
12:10:24 **19** MS. O'DELL: Object to the form.
12:10:25 **20** THE WITNESS: I don't -- I haven't read
12:10:27 **21** this, so I don't know what preceded the question
12:10:30 **22** there. I see what it says. So I don't have an
12:10:35 **23** opinion on that.
12:10:35 **24 Q.** (By Mr. Chachkes) Okay. Putting aside
12:10:38 **25** the transcript, I'm just going to ask you the
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12:10:40 **1** question independent of whatever this means in the
12:10:42 **2** transcript.
12:10:44 **3** Do you, Dr. Rigler, believe that
12:10:49 **4** transmission electron microscopy cannot tell you if
12:10:51 **5** you identify a single fiber whether or not that
12:10:54 **6** particle is asbestiform or nonasbestiform?
12:10:56 **7** MS. O'DELL: Object to form.
12:10:58 **8** THE WITNESS: Again, if they're including
12:11:05 **9** things like tensile strength, flexibility, that
12:11:09 **10** type of thing, you can't do that by TEM. So as
12:11:15 **11** far as the form goes, like asbestos, having a
12:11:18 **12** form of asbestos which is fibrous, the
12:11:21 **13** description of it, you definitely can.
12:11:23 **14** So but again, I don't know what the
12:11:25 **15** context of this is, so, you know, I don't have
12:11:30 **16** an opinion on that in reference to this.
12:11:32 **17** **Q.** (By Mr. Chachkes) Okay. Have you ever
12:11:33 **18** known Dr. Longo to use a geologic definition of
12:11:37 **19** asbestos?
12:11:37 **20** **A.** **No.**
12:11:38 **21** **Q.** Okay. And so when he testified that a TEM
12:11:42 **22** cannot tell you if you identify a single fiber
12:11:45 **23** whether or not that particle is asbestiform or
12:11:47 **24** nonasbestiform, you understand that to mean his
12:11:50 **25** regulatory definition; correct?
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12:11:52 **1** MS. O'DELL: Excuse me. Object to the
12:11:53 **2** form. Doesn't speak to the context.
12:11:56 **3** You may answer.
12:11:57 **4** THE WITNESS: Can you restate?
12:12:00 **5** MR. CHACHKES: Do you mind reading it
12:12:02 **6** back.
12:12:05 **7** (The record was read by the reporter.)
12:12:44 **8** THE WITNESS: Well, I mean, it would be
12:12:47 **9** based on the regulatory definition. So, I mean,
12:12:52 **10** that's all I can say about that.
12:12:55 **11** Again, I don't know what the context was
12:12:57 **12** in this. I can't speak for Dr. Longo. So
12:13:02 **13** that's the best answer I can give.
12:13:04 **14** **Q.** (By Mr. Chachkes) Is there any world in
12:13:05 **15** which it's correct to say that under your regulatory
12:13:08 **16** definition a TEM cannot tell you if you identify a
12:13:11 **17** single fiber whether or not that particle is
12:13:14 **18** asbestiform or nonasbestiform?
12:13:15 **19** MS. O'DELL: Object to the form.
12:13:17 **20** THE WITNESS: It's such a broad question
12:13:22 **21** about that, I don't know quite how to answer it,
12:13:26 **22** other than the way that I've already answered
12:13:28 **23** it. Because when you say in any world, I mean,
12:13:32 **24** it's very broad. Broad question.
12:13:34 **25** **Q.** (By Mr. Chachkes) Is there any way that
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12:13:36 **1** could be correct?
12:13:36 **2** **A.** **I don't know.**
12:13:38 **3** **Q.** Is there any peer-reviewed literature or
12:13:41 **4** regulatory material that says that TEM cannot tell
12:13:47 **5** you if you identify a single fiber whether or not
12:13:49 **6** that particle is asbestiform or nonasbestiform?
12:13:52 **7** **A.** **I mean, I can't think of any as I sit**
12:13:56 **8** **here. I can't think of any.**
12:13:57 **9** **Q.** Okay. Is there any regulatory material or
12:14:00 **10** peer-reviewed material that says the opposite, that
12:14:03 **11** TEM can tell you that if you identify a single fiber,
12:14:07 **12** whether or not that particle is asbestiform or
12:14:09 **13** nonasbestiform?
12:14:11 **14** MS. O'DELL: Object to the form.
12:14:13 **15** THE WITNESS: You're saying that it is not
12:14:24 **16** asbestiform?
12:14:25 **17** **Q.** (By Mr. Chachkes) So what I'm saying is,
12:14:28 **18** is there any peer-reviewed literature or regulatory
12:14:30 **19** material that confirms that TEM can tell you if you
12:14:35 **20** identify a single fiber whether or not that particle
12:14:38 **21** is asbestiform or nonasbestiform?
12:14:42 **22** **A.** **Well, there are -- yes. I mean, there are**
12:14:45 **23** **a number of regulatory documents that say that it**
12:14:48 **24** **can.**
12:14:48 **25** **Q.** Okay. Is 22262 one of those documents?
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12:14:52 **1** **A.** **I would have to -- again, I would want to**
12:14:55 **2** **review 22262 again to look at that before I make that**
12:14:59 **3** **answer.**
12:14:59 **4** **Q.** Well, you're using 22262 in this MDL case;
12:15:04 **5** right?
12:15:04 **6** **A.** **Yeah. I just need to review it again.**
12:15:06 **7** **Q.** And you use TEM to identify whether a
12:15:08 **8** single fiber is or is not asbestiform in this case;
12:15:11 **9** right?
12:15:11 **10** MS. O'DELL: Object to the form.
12:15:12 **11** THE WITNESS: Yes.
12:15:12 **12** **Q.** (By Mr. Chachkes) And that was pursuant
12:15:13 **13** to 22262; correct?
12:15:15 **14** **A.** **Well, no, it was not just the 22262.**
12:15:18 **15** **There were the other methods that were there, too.**
12:15:21 **16** **Q.** Okay.
12:15:21 **17** **A.** **Yeah.**
12:15:21 **18** **Q.** Did you follow the 22262 protocol for TEM?
12:15:25 **19** **A.** **To my knowledge, we did. And that also**
12:15:31 **20** **is -- is also the same type of protocol that is in**
12:15:34 **21** **the ASTM and also the EPA methods. So yeah.**
12:15:39 **22** **Q.** Does 22262 expressly say you can use TEM
12:15:43 **23** to identify whether or not a particle is asbestiform
12:15:47 **24** or nonasbestiform?
12:15:49 **25** **A.** **Again, I would like to review that just to**
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12:15:53 **1** be able to verify that it says -- actually says that.
12:15:58 **2** Q. You were involved in many more reports
12:16:19 **3** concerning J&J talc other than the MDL reports;
12:16:23 **4** right?
12:16:24 **5** MS. O'DELL: Object to the form.
12:16:25 **6** THE WITNESS: Some other reports.
12:16:27 **7** Q. (By Mr. Chachkes) So those were bottles
12:16:27 **8** that were not -- those are different bottles, not the
12:16:29 **9** MDL bottles?
12:16:30 **10** MS. O'DELL: Object to the form.
12:16:31 **11** THE WITNESS: They may have been, yes.
12:16:32 **12** Q. (By Mr. Chachkes) You didn't issue any
12:16:34 **13** other reports on the bottles at issue in this case,
12:16:37 **14** have you?
12:16:38 **15** MS. O'DELL: Object to the form.
12:16:39 **16** THE WITNESS: Again, I don't recall.
12:16:42 **17** Q. (By Mr. Chachkes) Are you aware that in
12:16:46 **18** the old reports the majority of particles you
12:16:50 **19** identified were fibers, and in this MDL the majority
12:16:53 **20** of particles you identified were bundles; are you
12:16:56 **21** aware of that?
12:16:57 **22** A. I'd have to look back at the reports to
12:16:59 **23** make that conclusion.
12:17:01 **24** Q. Okay. Given that the old reports and the
12:17:07 **25** new reports are both on J&J bottles, would you expect
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12:17:11 **1** the same fiber-to-bundle ratio in the two separate
12:17:16 **2** sets of reports?
12:17:17 **3** MS. O'DELL: Object to form.
12:17:18 **4** THE WITNESS: Not necessarily.
12:17:18 **5** Q. (By Mr. Chachkes) Why not?
12:17:19 **6** A. You get variation depending upon where the
12:17:22 **7** material was mined and combined.
12:17:25 **8** Q. For a -- if you isolate a single mine,
12:17:30 **9** let's say, just Vermont --
12:17:31 **10** A. Okay.
12:17:31 **11** Q. -- would you expect the old reports, the
12:17:35 **12** fiber-to-bundle ratio, to match the MDL report?
12:17:38 **13** MS. O'DELL: Object to the form.
12:17:39 **14** THE WITNESS: I would expect that they may
12:17:47 **15** follow the same kinds of trends, you know, as
12:17:51 **16** far as aspect ratio, that type of thing, yeah.
12:17:53 **17** Q. (By Mr. Chachkes) But what about the
12:17:55 **18** fiber-to-bundle ratio?
12:17:56 **19** A. Again, I'd have to look at that. I can't
12:17:59 **20** make a conclusion on that without looking at it.
12:18:01 **21** Q. Okay. So sitting here today you can't
12:18:05 **22** tell me if you would expect a certain degree of
12:18:08 **23** reproducibility for the Vermont mine bottles from the
12:18:12 **24** old reports as compared to the MDL bottles in this
12:18:14 **25** report?
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12:18:14 **1** MS. O'DELL: Object to the form.
12:18:16 **2** THE WITNESS: Could you just restate that?
12:18:27 **3** MR. CHACHKES: Do you mind reading that
12:18:29 **4** back.
12:18:29 **5** THE WITNESS: I know she can read it back,
12:18:31 **6** but can you restate it another way?
12:18:32 **7** Q. (By Mr. Chachkes) It's going to be read
12:18:33 **8** back. Sorry.
12:18:34 **9** MS. O'DELL: And if you still need that
12:18:36 **10** question rephrased, you may --
12:18:37 **11** THE WITNESS: That would be nice.
12:18:38 **12** MS. O'DELL: You may ask that.
12:18:40 **13** THE WITNESS: I'd like it to be rephrased.
12:18:42 **14** MR. CHACHKES: As long as we keep talking,
12:18:44 **15** she keeps typing.
12:18:48 **16** (The record was read by the reporter.)
12:19:12 **17** MS. O'DELL: Object to the form.
12:19:14 **18** THE WITNESS: Rephrase.
12:19:15 **19** Q. (By Mr. Chachkes) Would you expect that
12:19:18 **20** your fiber-to-bundle ratio for the Vermont samples
12:19:22 **21** from your old reports would be reproducible in
12:19:29 **22** analyzing another set of bottles like the set of
12:19:32 **23** bottles in the MDL?
12:19:33 **24** MS. O'DELL: Object to the form.
12:19:36 **25** Q. (By Mr. Chachkes) From the same mine?
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12:19:37 **1** MS. O'DELL: Object to the form.
12:19:38 **2** THE WITNESS: You know, I'm not a
12:19:39 **3** geologist. But once again, the -- you would
12:19:45 **4** have -- I would expect some variation. I would
12:19:48 **5** expect some variation.
12:19:49 **6** Q. (By Mr. Chachkes) When you say some
12:19:50 **7** variation, can you quantify?
12:19:51 **8** A. No. No. But I would expect because the
12:19:55 **9** materials out of the ground are, you know --
12:19:59 **10** depending upon the way they have been mixed, ground,
12:20:02 **11** mined, all of that, you could have some variation in
12:20:06 **12** that. Whether they were using a specific kind of
12:20:09 **13** flotation process at one time versus another, all of
12:20:12 **14** that kind of thing, you could get some variation.
12:20:15 **15** Q. Okay. Is it your position that the
12:20:19 **16** modified Blount TEM method you employed in your
12:20:24 **17** March 2018 report is materially identical to ISO
12:20:28 **18** 22262?
12:20:29 **19** A. It is substantially the same.
12:20:35 **20** Q. Is it materially the same?
12:20:36 **21** A. Substantially the same. If you're saying
12:20:39 **22** exactly the same, is that what you're asking?
12:20:41 **23** Q. Well, let's do that. Is it exactly the
12:20:44 **24** same?
12:20:44 **25** A. Okay. I'd say substantially the same.
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12:20:46 **1** Q. Okay. What degree do they differ?
12:20:50 **2** What ways do they differ?
12:20:50 **3** A. **There may be some variation, slight**
12:20:52 **4 variation in the densities, the heavy density liquid.**
12:20:55 **5** Q. Any other variation?
12:20:56 **6** A. **I can't think of any right off the bat.**
12:20:59 **7** Q. What's the average width of a tremolite
12:21:02 **8** fiber under TEM?
12:21:03 **9** A. **That varies depending on the size.**
12:21:05 **10** Q. And when you say depending on the size,
12:21:09 **11** what do you mean by that?
12:21:10 **12** A. **Well, I mean, it depends. It varies. It**
12:21:12 **13 can be 1/10 of a micron and up.**
12:21:14 **14** Q. So there's no -- in the published
12:21:21 **15** literature there's no average width of a tremolite
12:21:22 **16** fiber?
12:21:23 **17** MS. O'DELL: Object to the form.
12:21:24 **18** THE WITNESS: Oh, gosh. I don't know.
12:21:32 **19** There may be. But as far as there being an
12:21:36 **20** arrange width, again, it depends on how it's
12:21:38 **21** been mined and milled and processed.
12:21:41 **22** Q. (By Mr. Chachkes) Is there an average
12:21:42 **23** width of an anthophyllite fiber under TEM?
12:21:44 **24** A. **Same answer.**
12:21:45 **25** Q. What's the largest width an anthophyllite
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12:21:48 **1** particle can have and still be characterized as a
12:21:51 **2** fiber under a TEM?
12:21:52 **3** A. **As far -- as long as there are bundled**
12:21:59 **4 fibrils in there, you know, it could be pretty large.**
12:22:03 **5** Q. Well, the question's really what's the
12:22:05 **6** largest width an anthophyllite particle can have and
12:22:08 **7** still be characterized as a fiber?
12:22:10 **8** A. **Well, if it has the aspect ratio, it will**
12:22:13 **9** **still be -- it can be pretty large. It will still be**
12:22:15 **10** **considered as a fiber by TEM.**
12:22:17 **11** Q. Okay. And so you don't have an upper
12:22:19 **12** boundary by which you'll no longer say that's an
12:22:23 **13** anthophyllite fiber?
12:22:25 **14** MS. O'DELL: Object to the form.
12:22:26 **15** Q. (By Mr. Chachkes) The width, I'm talking
12:22:27 **16** about.
12:22:27 **17** A. **On a width. Well, again, it's got to meet**
12:22:30 **18** **the aspect ratio.**
12:22:31 **19** Q. But any time it meets the aspect ratio, it
12:22:34 **20** doesn't matter how wide it is, you can still
12:22:37 **21** characterize it as an anthophyllite particle?
12:22:38 **22** A. **Well, I mean, when you go from the TEM to**
12:22:41 **23** **the PLM scale, you're going orders of magnitude in**
12:22:44 **24** **size, and these are called fibrils. So, you know,**
12:22:47 **25** **they can be pretty darn large.**
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12:22:49 **1** Q. What's the largest width a tremolite
12:22:52 **2** particle can have and still be characterized as a
12:22:56 **3** fiber under TEM? Same answer?
12:22:58 **4** A. **Yeah.**
12:22:58 **5** Q. Okay. Are all of the fibers that you've
12:23:05 **6** identified in your reports as asbestos or asbestiform
12:23:11 **7** formed in the fibrous crystalline habit?
12:23:14 **8** A. **Originally, you know, looking at the**
12:23:18 **9** **structures, we get into that question of them being**
12:23:22 **10** **formed in a crystalline habit. So that is a growth**
12:23:29 **11** **mode for the production of the fibrils; but also, if**
12:23:34 **12** **you -- how do you want to say it?**
12:23:41 **13** **If massive tremolite, for instance, is**
12:23:46 **14** **milled a certain way, it can break in cleavage planes**
12:23:51 **15** **that will make it into the fibrils that are, you**
12:23:56 **16** **know, regulated type fibrils. Sure, you'll get**
12:23:59 **17** **cleavage fragments, ones that appear triangular and,**
12:24:04 **18** **you know, different kinds of shapes, but you will**
12:24:06 **19** **produce these other kind of fibrils too that will**
12:24:09 **20** **meet the definition.**
12:24:10 **21** Q. Okay. So a mineral that has a
12:24:18 **22** nonregulated and a regulated version can be connected
12:24:23 **23** in the cleavage plane but can be broken up such that
12:24:27 **24** it would become in your mind a regulated asbestos
12:24:29 **25** fiber?
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12:24:30 **1** MS. O'DELL: Object to the form.
12:24:31 **2** THE WITNESS: Well, this does happen.
12:24:35 **3** This does happen. And there's a recent
12:24:40 **4** publication for -- I think it's amosite,
12:24:45 **5** grunerite, that shows this happens.
12:24:48 **6** Q. (By Mr. Chachkes) Okay. What's the
12:24:49 **7** publication you're citing now?
12:24:50 **8** A. **It's a 2019. It's a recent publication.**
12:24:54 **9** Q. Can you tell me the name of it?
12:24:55 **10** A. **It's by Germine and Puffer, I believe it**
12:24:59 **11** **is.**
12:25:00 **12** Q. And you don't cite that in your report, do
12:25:02 **13** you?
12:25:02 **14** A. **Excuse me?**
12:25:03 **15** Q. You don't cite that in your report --
12:25:04 **16** A. **No, no. That's a recent publication.**
12:25:06 **17** Q. And who are Germain and Puffer?
12:25:09 **18** A. **They're a couple of researchers, I**
12:25:11 **19** **believe, at UC Cal.**
12:25:12 **20** Q. Do you know who funded their research?
12:25:15 **21** A. **I think the university did.**
12:25:16 **22** Q. Okay. So am I correct in understanding
12:25:20 **23** your testimony that not everything you've identified
12:25:23 **24** as asbestos and asbestiform in your report was formed
12:25:28 **25** in the -- necessarily formed in the crystalline
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12:25:31 **1** habit?

12:25:31 **2** MS. O'DELL: Object to the form.

12:25:33 **3** THE WITNESS: Well, again, it's not part

12:25:34 **4** of the definition, that it be in the crystalline

12:25:37 **5** habit. The definition has the parameters that

12:25:40 **6** we discussed already. If it is in that form,

12:25:45 **7** it's going to be classified like that.

12:25:48 **8** **Q.** (By Mr. Chachkes) If something is formed

12:25:53 **9** in the crystalline habit and has an aspect ratio

12:25:56 **10** under 5-to-1, would you call it regulated asbestos?

12:25:59 **11** **A.** Well, if it's 3-to-1, OSHA would.

12:26:02 **12** **Q.** If something was formed in the fibrous

12:26:04 **13** crystalline habit and was in a 2-to-1 aspect ratio,

12:26:08 **14** would you call it asbestos?

12:26:10 **15** **A.** That wouldn't meet the definition.

12:26:12 **16** **Q.** Okay. Does MAS have a protocol in place

12:26:18 **17** for describing the dimensions of fibers under a TEM?

12:26:22 **18** **A.** Yes.

12:26:22 **19** **Q.** Is it written?

12:26:24 **20** **A.** Yes, it's in accordance with the standard

12:26:26 **21** methods, all of these standard methods we've

12:26:28 **22** discussed.

12:26:29 **23** **Q.** Okay. So your written protocol for

12:26:37 **24** identifying what's asbestos or not under a TEM is

12:26:39 **25** just basically a repeat of the regulations?

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12:26:41 **1** **A.** Yes.

12:26:42 **2** **Q.** Okay. No change whatsoever --

12:26:44 **3** **A.** Well, I mean, it's -- it's in accordance

12:26:49 **4** with the regulation.

12:26:50 **5** **Q.** Okay. What form is it in? Is it like a

12:26:55 **6** piece of paper on a wall so TEM scientists can look

12:26:57 **7** at it? Is it an email? What it is?

12:26:59 **8** MS. O'DELL: Object to the form.

12:27:00 **9** THE WITNESS: It's a protocol. We have a

12:27:02 **10** protocol that the analysts have to abide by.

12:27:05 **11** **Q.** (By Mr. Chachkes) Just physically, is it

12:27:07 **12** a piece of paper that analysts memorize --

12:27:10 **13** **A.** It's a document, yeah.

12:27:11 **14** **Q.** Okay. Do the analysts have it near

12:27:13 **15** them --

12:27:14 **16** **A.** It's a standard operating procedure we

12:27:16 **17** have.

12:27:16 **18** **Q.** Okay. So we would ask that that be

12:27:18 **19** produced.

12:27:19 **20** Does MAS have a protocol in place for

12:27:22 **21** describing the dimensions of fibers under TEM, or is

12:27:26 **22** that the same answer?

12:27:27 **23** **A.** Same answer.

12:27:27 **24** **Q.** Same, okay.

12:27:33 **25** Is there additional data concerning the

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12:27:35 **1** samples you've reported on for TEM that is somewhere

12:27:39 **2** in your laboratory, like an electronic file that's

12:27:41 **3** not been produced, not in paper form for us?

12:27:44 **4** **A.** Not that I know of, no.

12:27:45 **5** **Q.** Was there any data generated in connection

12:27:48 **6** with the TEM analysis in this case that was thrown

12:27:53 **7** away or deleted?

12:27:54 **8** **A.** No.

12:27:54 **9** **Q.** I'm moving on to a new topic. It's

12:27:59 **10** 12:30ish. I'm happy to keep going. It would be a

12:28:02 **11** good breaking point but --

12:28:04 **12** **A.** I'm good to go. We can go.

12:28:06 **13** **Q.** Okay. I mean, we're going to have a lunch

12:28:08 **14** and we're going to come back, so it's not like we're

12:28:11 **15** going to finish before lunch.

12:28:13 **16** **A.** Oh. Oh, well.

12:28:13 **17** MS. O'DELL: It's up to you, Doctor. If

12:28:15 **18** you want to go a little longer --

12:28:16 **19** THE WITNESS: We can take a break if you

12:28:16 **20** want to take a break.

12:28:17 **21** MS. PARFITT: It's up to you.

12:28:18 **22** MS. O'DELL: It's really up to you.

12:28:21 **23** THE WITNESS: Okay. That's good. Break.

12:28:22 **24** (Lunch recess from 12:28 p.m. to 1:38 p.m.)

13:38:49 **25** **Q.** (By Mr. Chachkes) Good afternoon.

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13:39:27 **1** **A.** Good afternoon.

13:39:27 **2** **Q.** Am I correct that you are not going to

13:39:30 **3** testify about the PLM results in your report?

13:39:34 **4** **A.** That's correct.

13:39:34 **5** **Q.** Okay. I'll skip PLM questioning because

13:39:38 **6** of that.

13:39:38 **7** Am I correct that you are not going to

13:39:40 **8** testify about J3 results in your report?

13:39:43 **9** **A.** Dr. Longo will testify on that.

13:39:45 **10** **Q.** Okay. Not you; right?

13:39:47 **11** **A.** Correct.

13:39:47 **12** **Q.** Okay. So I'm going to skip questions on

13:39:50 **13** J3.

13:39:51 **14** Let me just ask one question, though. Why

13:39:54 **15** did MAS use J3?

13:39:57 **16** **A.** MAS used J3 to do XRD analysis. MAS

13:40:03 **17** doesn't have XRD capabilities.

13:40:05 **18** **Q.** But they did some other things beyond XRD;

13:40:08 **19** right?

13:40:09 **20** **A.** J3?

13:40:09 **21** **Q.** Yeah.

13:40:09 **22** **A.** Yes.

13:40:10 **23** **Q.** Okay. Why did they do those things?

13:40:13 **24** **A.** To my knowledge, it was to help verify

13:40:17 **25** results.

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13:40:18 **1 Q.** Verify results of things that were
13:40:20 **2** otherwise being duplicated by MAS?
13:40:23 **3 A.** **There may have been some of that, yes.**
13:40:25 **4 Again, if you would ask Dr. Longo about that, please.**
13:40:27 **5 Q.** Okay. What's an example of silicate, some
13:40:32 **6** silicate materials?
13:40:33 **7 A.** **Well, a whole group of phyllosilicates are**
13:40:39 **8 clay, clay minerals. There's lots of silicates. I**
13:40:43 **9 mean, the earth's crust is covered with silicates.**
13:40:46 **10 Q.** Is talc a silicate?
13:40:47 **11 A.** **Yes.**
13:40:47 **12 Q.** Are you aware that there's different
13:40:50 **13** grades of talc?
13:40:50 **14 A.** **Yes.**
13:40:51 **15 Q.** What are those grades?
13:40:54 **16 A.** **Well, they vary by composition, color,**
13:40:57 **17 size, particle size, that type of thing.**
13:40:59 **18 Q.** Is talc an asbestiform mineral?
13:41:05 **19 A.** **Fibrous talc could be described as an**
13:41:10 **20 asbestiform, yes.**
13:41:11 **21 Q.** Are asbestiform minerals silicates?
13:41:15 **22 A.** **Yes.**
13:41:16 **23 Q.** Do you know how many amphibole mineral
13:41:23 **24** species there are?
13:41:24 **25 A.** **Quite a few.**
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13:41:24 **1 Q.** Do you have an estimate?
13:41:25 **2 A.** **Not right off the top of my head. I bet**
13:41:29 **3 it's many.**
13:41:30 **4 Q.** Like more than 10?
13:41:31 **5 A.** **Yes.**
13:41:31 **6 Q.** More than 30?
13:41:33 **7 A.** **Yes.**
13:41:33 **8 Q.** When it comes time to give analysts in
13:41:40 **9** your labs samples of J&J talc to analyze, do you
13:41:44 **10** distribute them completely randomly?
13:41:47 **11** MS. O'DELL: Object to the form.
13:41:48 **12** THE WITNESS: Again, you would have to ask
13:41:49 **13** Dr. Longo about that. The TEM manager is the
13:41:54 **14** one who distributes the samples once they come
13:41:57 **15** in.
13:41:57 **16 Q.** (By Mr. Chachkes) Okay. Would it be
13:41:59 **17** better to distribute them randomly?
13:42:01 **18** MS. O'DELL: Object to the form.
13:42:03 **19** THE WITNESS: Well, I mean, we're going to
13:42:07 **20** analyze the samples that we receive, so, you
13:42:11 **21** know, random or not, it wouldn't make any
13:42:14 **22** difference.
13:42:14 **23 Q.** (By Mr. Chachkes) Would you expect two
13:42:21 **24** analysts to identify the same asbestos concentration
13:42:24 **25** from the same bottle of J&J talc?
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13:42:27 **1 A.** **The answer to that is yes, I would expect**
13:42:35 **2 that.**
13:42:36 **3 Q.** And is that empirically what you've been
13:42:40 **4** seeing?
13:42:41 **5** MS. O'DELL: Object to the form.
13:42:42 **6** THE WITNESS: Again, I don't know which
13:42:44 **7** ones you're referring to here. But from a
13:42:49 **8** quality standpoint, they do see the same things.
13:42:52 **9 Q.** (By Mr. Chachkes) Okay. If one --
13:42:54 **10** hypothetically, if one analyst looked at a bottle and
13:42:57 **11** saw 10,000 fibers per gram and another analyst looked
13:43:00 **12** at the same bottle and got a nondetect, would that be
13:43:03 **13** within the margin of error?
13:43:06 **14** MS. O'DELL: Object to the form.
13:43:10 **15** THE WITNESS: That would depend on the
13:43:12 **16** statistics that we were using, whether -- that
13:43:17 **17** would depend.
13:43:19 **18 Q.** (By Mr. Chachkes) Depend on what?
13:43:20 **19 A.** **It would depend on the number of**
13:43:22 **20 structures that they saw.**
13:43:23 **21 Q.** Okay. Well, you know how you determine
13:43:27 **22** structures; correct?
13:43:28 **23 A.** **Yes. Yes.**
13:43:28 **24 Q.** And you know the number of structures you
13:43:30 **25** need to extrapolate to 10,000 per gram?
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13:43:33 **1 A.** **Well, again, that varies. That can vary,**
13:43:39 **2 as I say, depending on what the detection limit is.**
13:43:42 **3 So when you're saying a certain number per gram,**
13:43:48 **4 that's based on it being above a certain detection**
13:43:51 **5 limit. So you may want to ask the question again to**
13:43:55 **6 clarify a little more.**
13:43:55 **7 Q.** Well, let's say one analyst analyzed an
13:44:02 **8** aliquot from a bottle and saw 10 fibers and another
13:44:05 **9** analyst analyzed an aliquot and didn't detect any
13:44:08 **10** fibers. Would that be within the margin of error?
13:44:11 **11 A.** **No.**
13:44:11 **12 Q.** Why not?
13:44:12 **13 A.** **That would be outside the margin of error.**
13:44:14 **14 Q.** Can you narrow for me what that margin of
13:44:17 **15** error is?
13:44:18 **16 A.** **Well, in our laboratory the coefficient of**
13:44:23 **17 variation between analysts is around I think 5 or**
13:44:27 **18 7 percent, something like that. So I would expect**
13:44:35 **19 the variation to be not much more than that. Maybe**
13:44:40 **20 1 fiber difference, something like that, depending**
13:44:42 **21 upon how many fibers they found.**
13:44:44 **22 Q.** When you say coefficient of variation,
13:44:46 **23** you're referring to the coefficient of variation
13:44:49 **24** study that you all did?
13:44:49 **25 A.** **Yes. Yes.**
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13:44:50 **1** Q. And were you part of that?
13:44:51 **2** A. Yes.
13:44:51 **3** Q. What about would the same coefficient of
13:45:00 **4** variation apply to the difference in type of asbestos
13:45:06 **5** that the analysts are finding?
13:45:08 **6** A. It should. Yes.
13:45:10 **7** Q. Okay. So you would expect that the ratio
13:45:12 **8** of tremolite to anthophyllite in a bottle should
13:45:17 **9** remain relatively constant amongst different analysts
13:45:20 **10** within 5 to 7 percent?
13:45:21 **11** A. Yes.
13:45:21 **12** Q. If the numbers were completely out of
13:45:29 **13** whack with that, let's say there was 30 percent
13:45:32 **14** difference, would you believe you need to rerun the
13:45:35 **15** results, or would you average the two? What would be
13:45:38 **16** your reaction?
13:45:39 **17** MS. O'DELL: Object to the form.
13:45:40 **18** THE WITNESS: Well, if the analysts
13:45:44 **19** weren't seeing the same thing -- I mean, this is
13:45:48 **20** the way we run the QC. For instance, if they
13:45:52 **21** haven't found -- if you put them in the same
13:45:56 **22** grid square and they haven't found the same
13:45:59 **23** number of structures there, then you
13:46:03 **24** typically -- we go back, we look at what was
13:46:05 **25** there, we sit down with the analyst and try to
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13:46:08 **1** understand why there is a difference like that,
13:46:11 **2** and then we resolve the difference at that
13:46:14 **3** point.
13:46:14 **4** Now, that's the way the process typically
13:46:17 **5** works.
13:46:17 **6** Q. (By Mr. Chachkes) Was your coefficient of
13:46:19 **7** variation study analysts looking at the same grid
13:46:22 **8** square?
13:46:22 **9** A. Yes.
13:46:22 **10** Q. Okay. Let's do it in a completely
13:46:25 **11** different hypothetical.
13:46:25 **12** A. All right.
13:46:26 **13** Q. The two analysts in your lab take aliquots
13:46:29 **14** out of a bottle that are different, so they end up
13:46:31 **15** looking at different grid squares.
13:46:33 **16** A. Yes.
13:46:33 **17** Q. Would you expect the results to be the
13:46:35 **18** same?
13:46:36 **19** MS. O'DELL: Object to the form.
13:46:37 **20** THE WITNESS: If the sample was
13:46:41 **21** homogeneous, let's hypothetically say that it is
13:46:46 **22** completely homogeneous, then, yes, I would
13:46:48 **23** expect the same kinds of results.
13:46:50 **24** Q. (By Mr. Chachkes) Do you know whether or
13:46:51 **25** not bottles are homogeneous, samples are homogeneous?
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13:46:56 **1** A. They should be because they're mixed prior
13:46:59 **2** to the actual analysis, you know, they're mixed in
13:47:02 **3** preparation, the sample is.
13:47:03 **4** Q. Wouldn't you expect greater variation when
13:47:06 **5** two analysts are looking at their own grids
13:47:12 **6** separately rather than comparing what they see under
13:47:15 **7** the same grid?
13:47:16 **8** MS. O'DELL: Object to the form.
13:47:17 **9** THE WITNESS: Yeah. That's a good
13:47:19 **10** question. We're not doing chemistry here.
13:47:23 **11** We're doing particle analysis. So in chemistry
13:47:26 **12** where you have something that is in, for
13:47:29 **13** instance, in solution, it's mixed in solution,
13:47:31 **14** it's dispersed in that solution by Brownian
13:47:37 **15** motion forces that keep it very random and
13:47:39 **16** mixed.
13:47:40 **17** Wherein a particle solution, if you want
13:47:44 **18** to call it that, you can have variation based on
13:47:46 **19** the particle size and a number of factors, but
13:47:50 **20** the objective is to make the samples as
13:47:53 **21** homogeneous as possible.
13:47:54 **22** So you would expect them, if they took a
13:47:56 **23** sample from the same bottle and they're both
13:47:58 **24** homogeneous, you should get close to the same
13:48:01 **25** answer.
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13:48:01 **1** Q. (By Mr. Chachkes) Okay. In your
13:48:04 **2** experience do two of your analysts looking at the
13:48:06 **3** same exact grid identify the same bundle-to-fiber
13:48:11 **4** ratio?
13:48:12 **5** A. I would say that most of the time they do.
13:48:18 **6** There may be some slight variations in the size of
13:48:23 **7** the structure. It will be the same structure because
13:48:25 **8** you can see it in the images that they make, but they
13:48:30 **9** may have some slight variation in the size based on
13:48:33 **10** the microscope that's being used because a couple of
13:48:37 **11** the scopes we have have slightly different gratitudes
13:48:42 **12** in the scope so there may be a little difference in
13:48:45 **13** the length or the width, just a slight amount.
13:48:47 **14** Q. But generally speaking, you would expect
13:48:49 **15** two analysts in your laboratory looking at the same
13:48:51 **16** grid pattern to roughly identify the same
13:48:55 **17** fiber-to-bundle ratio?
13:48:56 **18** A. Yes.
13:48:58 **19** Q. Roughly speaking, you would expect two
13:49:00 **20** analysts looking at the same grid opening to --
13:49:08 **21** roughly speaking, you would expect two analysts
13:49:10 **22** looking at the same grid opening to identify the same
13:49:14 **23** asbestos type composition, like anthophyllite versus
13:49:17 **24** tremolite versus no detect?
13:49:20 **25** A. Yes.
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13:49:20 **1** Q. Okay. And that's based on the coefficient
13:49:22 **2** of variation study?
13:49:23 **3** A. Yes, and also their training. So they're
13:49:27 **4** well versed in this.
13:49:28 **5** Q. Okay. You wouldn't know whether Lee Poye
6 would expect the same thing?
7 THE REPORTER: I'm sorry, you would or
8 wouldn't?
13:49:39 **9** Q. (By Mr. Chachkes) You would not expect --
13:49:40 **10** you would not know whether Lee Poye would say the
13:49:41 **11** same thing --
12 MS. O'DELL: Object to the form.
13:49:42 **13** Q. (By Mr. Chachkes) -- is that outside of
13:49:43 **14** your knowledge?
13:49:44 **15** MS. O'DELL: Excuse me, I didn't mean to
13:49:46 **16** interrupt you. Are you finished?
13:49:48 **17** Object to the form.
13:49:49 **18** THE WITNESS: All right. Well, as being a
13:49:54 **19** certified laboratory and having earned
13:49:57 **20** protocols, I would expect that their analysts
13:49:59 **21** would find the same kinds of things. There may
13:50:03 **22** be some variation, but again, you know, there is
13:50:10 **23** slight variation between laboratories.
13:50:12 **24** Q. (By Mr. Chachkes) Okay. Did you ever
13:50:13 **25** quantify the slight variation between laboratories?
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13:50:16 **1** MS. O'DELL: Object to the form.
13:50:17 **2** THE WITNESS: In this case, no. We did
13:50:20 **3** see variation, and that's in the report. But
13:50:25 **4** again, it doesn't change what has been found.
13:50:30 **5** There were, I believe, a couple by TEM that we
13:50:33 **6** weren't able to verify, so, you know, it does
13:50:35 **7** happen.
13:50:35 **8** Q. (By Mr. Chachkes) Would you --
13:50:41 **9** A. But for the most part, we did agree.
13:50:44 **10** Q. Okay. Let's compare -- let's talk about
13:50:48 **11** on the one hand the non-MDL samples that you guys
13:50:52 **12** have analyzed of J&J talc, and on the other hand MDL
13:50:56 **13** samples of J&J talc.
13:50:57 **14** Would you expect the results for, let's
13:51:01 **15** say, 150 tests of the non-MDL samples to look roughly
13:51:08 **16** like the 150 tests of the MDL samples?
13:51:13 **17** MS. O'DELL: Objection to form. Without
13:51:15 **18** limitation on time, et cetera? Product?
13:51:19 **19** THE WITNESS: It's a hypothetical. But if
13:51:23 **20** there -- I mean, if they're the same product
13:51:26 **21** from the same lot, I would expect similar
13:51:29 **22** results.
13:51:29 **23** Q. (By Mr. Chachkes) What about without that
13:51:33 **24** qualification, let's say we know they're from the
13:51:36 **25** same mine but you know nothing else, would you expect
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13:51:42 **1** the results from the non-MDL samples to look like the
13:51:46 **2** MDL samples?
13:51:47 **3** A. I mean, if they're splits of the same
13:51:51 **4** sample or -- oh, they're different.
13:51:51 **5** Q. They're different. So you understand that
13:51:53 **6** the non-MDL samples are literally different bottles
13:51:56 **7** than the MDL samples?
13:51:58 **8** A. Yeah. I don't have an opinion on that. I
13:52:04 **9** don't have an opinion. I'd have to think about that.
13:52:06 **10** Q. Would you expect the type of asbestos
13:52:08 **11** found to be roughly the same?
13:52:11 **12** A. Same answer.
13:52:12 **13** Q. Okay. No opinion?
13:52:15 **14** A. Yeah, right.
13:52:16 **15** Q. If you had an analyst who told you he had
13:52:24 **16** a nondetect for asbestos in a bottle, a sample from a
13:52:28 **17** bottle --
13:52:28 **18** A. Yes.
13:52:29 **19** Q. -- would you expect another analyst
13:52:32 **20** separately on a different day analyzing that same
13:52:35 **21** bottle to get a nondetect?
13:52:38 **22** A. If the sample was prepared the same way
13:52:47 **23** and the detection limit was the same, I would expect
13:52:52 **24** similar results.
13:52:53 **25** Q. Okay. That goes to the reproducibility of
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13:52:58 **1** your --
13:52:59 **2** A. Yeah.
13:52:59 **3** Q. Okay. When you present -- what's more
13:53:05 **4** accurate of a representation of what's in a bottle of
13:53:09 **5** J&J talc, a single analysis or multiple analyses
13:53:16 **6** separately averaged?
13:53:18 **7** MS. O'DELL: Object to the form.
13:53:19 **8** THE WITNESS: Let me put it in terms of
13:53:28 **9** how FDA does their thing. A laboratory runs a
13:53:35 **10** study to validate a method. That's the way it's
13:53:39 **11** done. They will validate the method based on
13:53:43 **12** accuracy, precision, reproducibility, stability,
13:53:46 **13** all these different factors.
13:53:48 **14** And when they're done with that, when
13:53:51 **15** they're done with that validation study, now
13:53:53 **16** they have a method that they will use that is
13:53:56 **17** allowed to use one sample from that to get a
13:54:00 **18** result. Because they validated their
13:54:06 **19** methodology and are using a standard
13:54:07 **20** methodology, that's what's allowed by FDA.
13:54:11 **21** So I would expect one sample should be
13:54:12 **22** fine. You can do more, you can average more,
13:54:16 **23** but the one sample should be representative
13:54:19 **24** based on the methodology.
13:54:20 **25** Q. (By Mr. Chachkes) So my question was not
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13:54:22 **1** about adequacy or what follows regulatory methods.
 13:54:28 **2** I'm just saying what would you personally believe to
 13:54:30 **3** be more reliable, a single analysis from a bottle or
 13:54:36 **4** multiple separate analyses from a bottle averaged?
 13:54:39 **5** MS. O'DELL: Object to the form.
 13:54:40 **6** THE WITNESS: I would say the single
 13:54:42 **7** sample based on the methodology that we use that
 13:54:45 **8** has been validated, published. A single sample
 13:54:50 **9** should be fine.
 13:54:51 **10** **Q.** (By Mr. Chachkes) Do you expect that the
 13:54:52 **11** multiple samples' average would be precisely the
 13:54:55 **12** same?
 13:54:56 **13** **A.** **I don't know about --**
 13:54:57 **14** MS. O'DELL: Object to form.
 13:54:58 **15** THE WITNESS: -- precisely the same, but
 13:54:59 **16** they should be very similar.
 13:55:01 **17** **Q.** (By Mr. Chachkes) But you're not going to
 13:55:02 **18** say that one's better in terms of a more accurate
 13:55:05 **19** representation of what's in the bottle?
 13:55:07 **20** MS. O'DELL: Object to the form.
 13:55:08 **21** THE WITNESS: Well, now you've got an
 13:55:09 **22** average. So you got an average of multiples,
 13:55:13 **23** they should be very similar.
 13:55:14 **24** If you take a single, you should get a
 13:55:17 **25** representative that is close to the average, you
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13:56:04 **1** bottle and someone else presented you, let's say, ten
 13:56:07 **2** different analyses, separate analyses averaged, you
 13:56:10 **3** would say those are equally representative, the
 13:56:13 **4** standard definitions, the margin of error, same for
 13:56:16 **5** both?
 13:56:17 **6** MS. O'DELL: Object to the form.
 13:56:18 **7** THE WITNESS: Well, the ten will give you
 13:56:21 **8** an average with a standard deviation, and if
 13:56:23 **9** that single one falls within that, it's still
 13:56:27 **10** adequate analysis of that and it's still
 13:56:30 **11** acceptable.
 13:56:30 **12** **Q.** (By Mr. Chachkes) The question is would
 13:56:32 **13** those two examples have the same standard deviations
 13:56:35 **14** and margins of error?
 13:56:37 **15** MS. O'DELL: Object to the form.
 13:56:38 **16** THE WITNESS: Well, they won't. Of
 13:56:39 **17** course, you've got one that's got ten and one
 13:56:41 **18** has one. But I'm going by a method that's been
 13:56:44 **19** validated as accepted as a standard method. You
 13:56:48 **20** should be able to take one sample and it be
 13:56:50 **21** representative, yes.
 13:56:50 **22** **Q.** (By Mr. Chachkes) When you say they won't
 13:56:51 **23** have the same margin of error, the average of ten
 13:56:54 **24** would have a smaller margin of error; correct?
 13:56:57 **25** **A.** **Not --**
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13:55:20 **1** know, within one standard definition of the
 13:55:22 **2** average. So that's what I would expect.
 13:55:24 **3** **Q.** (By Mr. Chachkes) Okay.
 13:55:25 **4** **A.** **And it's acceptable to have something**
 13:55:27 **5** **within two to three standard deviations.**
 13:55:30 **6** **Q.** I'm just asking a question about which
 13:55:31 **7** would be more representative of what objectively is
 13:55:34 **8** in the bottle, one analysis or multiple analyses
 13:55:39 **9** averaged, which would be more representative?
 13:55:41 **10** MS. O'DELL: Object to the form.
 13:55:42 **11** THE WITNESS: Well, the single can be
 13:55:43 **12** representative, absolutely.
 13:55:44 **13** **Q.** (By Mr. Chachkes) And --
 13:55:45 **14** **A.** **I know you're saying more, I get that.**
 13:55:47 **15** **Q.** Yeah.
 13:55:47 **16** **A.** **I understand that.**
 13:55:47 **17** **Q.** Can you answer the question?
 13:55:48 **18** **A.** **Sure.**
 13:55:48 **19** **Q.** Which is more representative?
 13:55:49 **20** **A.** **Which is more representative?**
 13:55:51 **21** **Q.** Yeah.
 13:55:51 **22** **A.** **Any of those three, if there were three of**
 13:55:54 **23** **them, would be representative. Any of them.**
 13:55:55 **24** **Q.** Okay. So if someone presented you a data
 13:55:59 **25** for one analysis of the asbestos concentration for a
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13:56:57 **1** MS. O'DELL: Object to the form.
 13:56:59 **2** THE WITNESS: -- necessarily. It could.
 13:57:00 **3** It could. Yep.
 13:57:01 **4** **Q.** (By Mr. Chachkes) Okay. In what instance
 13:57:01 **5** would the ten done by the exact same procedure have a
 13:57:04 **6** larger margin of error when averaged than the one?
 13:57:07 **7** **A.** **Well, the one's not going to -- the one is**
 13:57:10 **8** **the one. So what I'm saying is the one would fall**
 13:57:14 **9** **within the group of ten, so it would be**
 13:57:16 **10** **representative.**
 13:57:17 **11** **Q.** I'm not asking questions about
 13:57:18 **12** representative in any way whatsoever.
 13:57:20 **13** **A.** **I know. I'm trying to answer from a**
 13:57:21 **14** **scientific point of view.**
 13:57:23 **15** **Q.** Yeah. So if you want to be a scientist
 13:57:25 **16** about it, I would appreciate you under -- like,
 13:57:27 **17** listen to the words I'm saying, okay? I'm talking
 13:57:29 **18** about the standard deviations, not what's
 13:57:32 **19** representative, just the math of standard deviations.
 13:57:34 **20** **A.** **Well, there's no --**
 13:57:34 **21** MS. O'DELL: Object --
 13:57:36 **22** THE WITNESS: -- no standard deviation in
 13:57:38 **23** one. So you're trying to compare ten to one and
 13:57:41 **24** say standard deviation, and it's not working.
 13:57:43 **25** **Q.** (By Mr. Chachkes) Okay. How about
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13:57:43 **1** comparing two averaged and 100 averaged --
13:57:46 **2 A. Well, now all of a sudden now we're at two**
13:57:51 **3 and ten instead of one and ten.**
13:57:53 **4 Q. 100.**
13:57:54 **5 A. Or 100. Yeah, no, I'm talking about you**
13:57:55 **6 want to know about one, and I'm telling you one is**
13:57:57 **7 representative. That's my opinion.**
13:57:58 **8 Q. Just asking about standard deviations. Is**
13:58:01 **9 it possible to talk about the math of standard**
10 deviations without saying the word representative?
11 MS. O'DELL: Object to the form.
12 THE REPORTER: Wait. I'm sorry, say it
13 again, please.
13:58:07 **14 Q. (By Mr. Chachkes) Is it possible to talk**
13:58:08 **15 about the math of standard deviations without using**
13:58:11 **16 the word representative?**
13:58:12 **17 MS. O'DELL: Object to the form.**
13:58:13 **18 THE WITNESS: I'm not quite sure what**
13:58:18 **19 you're getting at.**
13:58:18 **20 Q. (By Mr. Chachkes) Okay. Every time I ask**
13:58:21 **21 you about standard deviations, you say**
13:58:23 **22 representative. I'm just talking about the math. Do**
13:58:25 **23 you understand that?**
13:58:26 **24 A. Yeah, but --**
13:58:26 **25 MS. O'DELL: Object to the form.**
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13:58:27 **1 THE WITNESS: -- I mean as far as -- I**
13:58:31 **2 mean, if you read back some of what I said, how**
13:58:34 **3 many times did I say representative with that?**
13:58:36 **4 Was it quite a few?**
13:58:37 **5 Q. (By Mr. Chachkes) It's a bit of a burden**
13:58:39 **6 to put on the reporter.**
13:58:40 **7 A. I know, but I'm like I don't recall it**
13:58:41 **8 being so much a part of the standard deviation, you**
13:58:44 **9 know, answer.**
13:58:45 **10 Q. Okay. Let me see if you can answer this**
13:58:46 **11 question without using the words representative or**
13:58:49 **12 what's regulatory or -- just about a question about**
13:58:52 **13 standard deviation. Listen to the question.**
13:58:54 **14 MS. O'DELL: You may answer it any way you**
13:58:56 **15 choose.**
13:58:56 **16 THE WITNESS: I know. I mean, when I say**
13:58:59 **17 representative, I'm talking about that sample**
13:59:01 **18 being representative of the bottle.**
13:59:03 **19 Q. (By Mr. Chachkes) Okay.**
13:59:04 **20 A. That's what I'm talking about**
13:59:05 **21 representative. I didn't say it was representative**
13:59:07 **22 about standard deviation.**
23 Q. Okay.
13:59:08 **24 A. I said it's representative of what is in**
13:59:09 **25 the bottle.**
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13:59:10 **1 Q. This is a new, independent question.**
13:59:12 **2 A. Okay.**
13:59:12 **3 Q. And --**
13:59:13 **4 A. New question.**
13:59:14 **5 Q. You've got two samples from one -- a**
13:59:19 **6 bottle?**
13:59:19 **7 A. Yes.**
13:59:19 **8 Q. Separately analyzed?**
13:59:21 **9 A. Okay.**
13:59:21 **10 Q. Average them on one hand?**
13:59:23 **11 A. Yes.**
13:59:23 **12 Q. You've got 100 samples from that same**
13:59:25 **13 bottle average -- and separately analyze those and**
13:59:28 **14 average them, which is going to have a higher**
13:59:31 **15 standard deviation?**
13:59:33 **16 MS. O'DELL: Object to the form.**
13:59:34 **17 THE WITNESS: I can't tell you that.**
13:59:35 **18 Q. (By Mr. Chachkes) Okay. Why can't you**
13:59:36 **19 tell me that?**
13:59:36 **20 A. Because I don't have the numbers. I don't**
13:59:39 **21 have any numbers to work with.**
13:59:40 **22 Q. In what world is this hypothetical such**
13:59:44 **23 that the standard deviation is smaller for the two on**
13:59:48 **24 average than the 100 on average?**
13:59:49 **25 MS. O'DELL: Object to the form.**
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13:59:50 **1 THE WITNESS: It could be the same.**
13:59:53 **2 Standard deviation could be exactly the same.**
13:59:54 **3 Q. (By Mr. Chachkes) Okay. Is there any**
13:59:55 **4 situation where the two is going to have a lower**
13:59:57 **5 deviation?**
13:59:57 **6 A. A lower standard deviation?**
13:59:59 **7 Q. Right.**
14:00:00 **8 A. The two have a lower standard deviation?**
14:00:07 **9 Q. Right.**
14:00:07 **10 A. Possibly.**
11 Q. How?
14:00:07 **12 A. Well, it depends on how close the results**
14:00:09 **13 are. The closer they are, the smaller the standard**
14:00:11 **14 deviation.**
14:00:11 **15 Q. Okay. That's your opinion of how standard**
14:00:13 **16 deviation is calculated?**
14:00:15 **17 MS. O'DELL: Object to the form.**
14:00:15 **18 THE WITNESS: We didn't talk about how**
14:00:17 **19 it's calculated. There's a formula for that.**
14:00:19 **20 Q. (By Mr. Chachkes) Okay.**
14:00:19 **21 A. Okay. But the closer the values are to**
14:00:25 **22 each other, the smaller the standard deviation's**
14:00:29 **23 going to be.**
14:00:29 **24 Q. Did your analysts use the point counting**
14:00:32 **25 method?**
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14:00:32 **1 A. Are we back to PLM?**
14:00:34 **2 Q.** Well, there's a point counting method for
14:00:37 **3** PLM and SEM.
14:00:38 **4 A. Yeah.**
14:00:38 **5 Q.** So you don't do SEM, right?
14:00:39 **6 A. No.**
14:00:40 **7 Q.** Okay. All right. I'm going to skip that.
14:00:42 **8 A. No. No. No. Yep, okay.**
14:00:43 **9 Q.** I'll skip that, that's fine.
14:00:49 **10** So let's talk about the coefficient of
14:00:50 **11** variation study. I'm just going to give it to you.
14:00:52 **12 A. Okay.**
14:00:53 **13 Q.** We will mark it as an exhibit. What's the
14:00:56 **14** next exhibit? She has to mark it.
15 A. Yep.
16 (Defendants' Exhibit 3 was marked for
14:01:22 **17** identification.)
14:01:22 **18 Q.** (By Mr. Chachkes) All right. So is this
14:01:26 **19** the coefficient of variation study that you referred
14:01:29 **20** to earlier?
14:01:30 **21 A. Yes.**
14:01:42 **22 Q.** And that's where you got that 5 to 7
14:01:45 **23** percent deviation number from?
14:01:46 **24 A. Yes.**
14:01:46 **25 Q.** Is there a right answer and a wrong answer
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14:01:51 **1** as to whether someone you're looking at visually
14:01:54 **2** under TEM is a fiber or bundle?
14:01:56 **3** MS. O'DELL: Object to the form.
14:01:57 **4** THE WITNESS: Is a fiber or a bundle a
14:02:02 **5** right answer or a wrong answer? I would say
14:02:04 **6** yes.
14:02:05 **7 Q.** (By Mr. Chachkes) So is the coefficient
14:02:10 **8** of variation also -- can we also refer to it as an
14:02:13 **9** error rate? Is that the same thing?
14:02:14 **10 A. Yes.**
14:02:14 **11 Q.** And for this coefficient of variation you
14:02:18 **12** bought off-the-shelf J&J baby powder and added a
14:02:22 **13** known tremolite asbestos and anthophyllite asbestos
14:02:24 **14** standard reference material?
14:02:26 **15 A. Yes.**
14:02:27 **16 Q.** And you spiked the J&J baby powder with
14:02:31 **17** enough asbestos to reach a concentration of about
14:02:33 **18** .3 percent?
14:02:33 **19 A. Yes.**
14:02:34 **20 Q.** And the highest concentration of any
14:02:35 **21** bottle that you've tested in this case is
14:02:38 **22** .035 percent; correct?
14:02:42 **23** MS. O'DELL: Object to the form.
14:02:43 **24** THE WITNESS: I would have to check and
14:02:44 **25** see.
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14:02:44 **1 Q.** (By Mr. Chachkes) Okay. Do you have --
14:02:44 **2** just sitting here today, without referring to the
14:02:46 **3** report, do you have an idea of what the highest
14:02:48 **4** concentration of any bottle of MDL samples that you
14:02:51 **5** tested is?
14:02:52 **6** MS. O'DELL: Object to the form.
14:02:53 **7** THE WITNESS: Again, I can't remember off
14:02:54 **8** the top of my head right now, yeah.
14:02:55 **9 Q.** (By Mr. Chachkes) That's fine. It's not
14:02:57 **10** a memory test.
11 A. Yep.
14:02:58 **12 Q.** For the coefficient of variation you
14:03:00 **13** prepared 25 grid openings; correct?
14:03:02 **14 A. Yes.**
14:03:02 **15 Q.** And then you had four TEM analysts look at
14:03:06 **16** the exact same grids and analyze them for tremolite
14:03:09 **17** and anthophyllite asbestos; correct?
14:03:10 **18 A. Yes. Yes.**
14:03:11 **19 Q.** And so those four analysts were looking at
14:03:13 **20** the exact same thing?
14:03:14 **21 A. Yes.**
14:03:14 **22 Q.** And these are the analysts who did the
14:03:19 **23** testing of the MDL samples?
14:03:21 **24 A. To my knowledge, yes.**
14:03:22 **25 Q.** Do you consider the error rate that is
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14:03:28 **1** your conclusion in the coefficient of variation study
14:03:31 **2** to be a good one for a lab?
14:03:33 **3 A. Yes.**
14:03:33 **4 Q.** Looking specifically at the count sheets
14:03:37 **5** for tremolite, two of the analysts found nine
14:03:42 **6** structures in the sample and two found ten
14:03:44 **7** structures; correct?
14:03:45 **8 A. Yes.**
14:03:45 **9 Q.** And that's the 6 percent error rate you
14:03:49 **10** were talking about, the roughly 6 percent error rate?
14:03:51 **11** MS. O'DELL: Object to the form.
14:03:52 **12** THE WITNESS: That's part of the way it's
14:03:54 **13** calculated, yes.
14:03:55 **14 Q.** (By Mr. Chachkes) Okay. What other ways
14:03:58 **15** was it calculated?
14:03:59 **16 A. That's the way it was calculated according**
14:04:01 **17 to the formula we used.**
14:04:02 **18 Q.** Okay.
14:04:03 **19 A. Yep.**
14:04:03 **20 Q.** Your analysts wrote down whether the
14:04:08 **21** structure they found was a fiber or bundle; right?
14:04:10 **22 A. Yes.**
14:04:11 **23 Q.** This is a part of the study parameters;
24 right?
14:04:17 **25 A. Yes.**
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14:04:17 **1** Q. Let me --
14:04:22 **2** A. I mean, the rate is based on the number of
14:04:24 **3** structures that they counted. Now, they may have
14:04:26 **4** been a fiber or a bundle, but it's the total number
14:04:29 **5** of structures they counted. Yep.
14:04:31 **6** MR. CHACHKES: Let's mark as the next
14:04:32 **7** exhibit, what are we on, 4?
8 (Defendants' Exhibit 4 was marked for
14:04:52 **9** identification.)
14:04:52 **10** Q. (By Mr. Chachkes) So what we have marked
14:04:55 **11** as Rigler 4 is a demonstrative we worked up so that
14:04:57 **12** we can see -- compare the analysts' work against each
14:04:59 **13** other.
14:05:00 **14** Can you just confirm that -- let's look,
14:05:03 **15** for example, at analyst 1, what they found for grid
14:05:10 **16** opening A8-E2?
14:05:16 **17** A. Which analysis is this? Which sample is
14:05:17 **18** this?
14:05:18 **19** Q. So this is -- you've gone to the appendix,
14:05:21 **20** right, of Rigler 3.
14:05:26 **21** A. What? Where are we --
14:05:29 **22** Q. So Rigler 3 is the coefficient of
14:05:32 **23** variation study?
14:05:33 **24** A. Okay.
14:05:33 **25** Q. And if you go into -- there are sheets for
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14:05:38 **1** different analysts; right?
14:05:39 **2** A. Yeah, these are the count sheets, right.
14:05:41 **3** Q. Right. So if you go to the first analyst
14:05:48 **4** and you go to A8-E2 --
14:05:51 **5** A. Okay.
14:05:51 **6** Q. -- you see that the structure identified
14:05:53 **7** was a bundle --
14:05:54 **8** A. Okay.
14:05:54 **9** Q. -- right?
14:05:55 **10** A. Yes.
14:05:56 **11** Q. Okay. And then in my demonstrative you
14:05:58 **12** see that's a bundle; right?
14:06:00 **13** A. Right.
14:06:00 **14** Q. And then you go to analyst number 2 -- is
14:06:06 **15** that the second page?
14:06:07 **16** A. Yes.
14:06:07 **17** Q. Okay. And it says in the upper left-hand
14:06:09 **18** corner analyst 2?
14:06:10 **19** A. Yes.
14:06:10 **20** Q. Okay. That for A8-E2 that analyst
14:06:16 **21** identified a fiber?
14:06:17 **22** A. Okay.
14:06:17 **23** Q. Is that correct?
14:06:18 **24** A. Uh-huh.
14:06:19 **25** Q. Okay. And that's reflected in the
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14:06:21 **1** demonstrative?
14:06:22 **2** A. Yep.
14:06:22 **3** Q. And analyst number 3, A8-E2, that analyst
14:06:27 **4** detected a fiber?
14:06:28 **5** A. Yes.
14:06:29 **6** Q. Okay. And then analyst number 4, A8-E2,
14:06:34 **7** that analyst detected a bundle?
14:06:36 **8** A. Yes. Yep.
14:06:37 **9** MS. O'DELL: Did you say A8-2 twice?
14:06:41 **10** THE WITNESS: This one.
14:06:41 **11** MR. CHACHKES: A8-E2.
14:06:43 **12** THE WITNESS: Yeah. Is that grid square?
14:06:44 **13** MS. O'DELL: Yeah.
14 THE WITNESS: Yeah.
14:06:45 **15** MS. O'DELL: Got it. And then for --
14:06:49 **16** Q. (By Mr. Chachkes) Okay. So what we've
14:06:51 **17** done is we've summarized these grid openings in this
14:06:55 **18** demonstrative in that way --
19 A. Right.
14:06:56 **20** Q. -- do you follow me so far?
14:06:58 **21** A. Yes.
14:06:58 **22** Q. And your analysts are trained to
14:07:00 **23** distinguish between a fiber and a bundle; right?
14:07:02 **24** A. Yes.
14:07:02 **25** Q. And you ran this experiment to detect how
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14:07:06 **1** good your analysts were at identifying the same
14:07:09 **2** thing?
14:07:09 **3** MS. O'DELL: Object to the form.
14:07:10 **4** Q. (By Mr. Chachkes) Is that a yes?
14:07:11 **5** A. That would be yes.
14:07:11 **6** Q. But out of the 11 grid openings, your
14:07:14 **7** analysts only came to consensus on the type of
14:07:16 **8** structure they found only once?
14:07:18 **9** MS. O'DELL: Object to the form.
14:07:19 **10** THE WITNESS: Every time they came to the
14:07:20 **11** consensus that it was tremolite.
14:07:22 **12** Q. (By Mr. Chachkes) This is not the
14:07:23 **13** question.
14:07:23 **14** A. But that is the answer. This is what
14:07:25 **15** we're concerned about here, is it asbestos.
14:07:27 **16** Q. The question before you is: Out of 11
14:07:30 **17** grid openings your analysts only came to a consensus
14:07:33 **18** on the type of structure they found only once?
14:07:36 **19** A. What's that? Out of 11 grid openings?
14:07:39 **20** Q. Right.
14:07:40 **21** A. No.
14:07:40 **22** Q. Okay. Look at the demonstrative.
23 A. Okay.
14:07:43 **24** Q. For A8-E2 your analysts did not find the
14:07:46 **25** same structure; right? Two found bundle, two found
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14:07:52 **1** fiber?
14:07:52 **2 A. Uh-huh.**
14:07:53 **3 Q.** For A8-E4 they all agree it's a fiber?
14:07:57 **4 A. Uh-huh.**
14:07:57 **5 Q.** For A8-E5 they did not agree whether it
14:08:00 **6** was a bundle or fiber.
14:08:02 **7 A. Okay.**
14:08:03 **8** MS. O'DELL: And feel free to check if you
14:08:05 **9** need to check the data. It's in the
14:08:08 **10** demonstrative.
14:08:08 **11 Q.** (By Mr. Chachkes) Yeah. I mean, if you
14:08:09 **12** think we're putting a fraudulent --
13 A. No --
14 Q. -- in front of you --
14:08:13 **15 A. -- no.**
14:08:13 **16** MS. O'DELL: I think mistakes can happen.
17 THE WITNESS: I'm sure they can.
14:08:15 **18** MS. O'DELL: I think probably the others
14:08:16 **19** happen, too, but I'm not suggesting that in this
14:08:18 **20** situation.
14:08:18 **21 Q.** (By Mr. Chachkes) So you can see for the
14:08:20 **22** 11 grid openings on the demonstrative we put before
14:08:23 **23** you, there was only one instance where the analysts
14:08:27 **24** agreed on the fiber structure.
14:08:30 **25 A. Okay.**
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14:08:31 **1 Q.** Right?
14:08:32 **2 A. Okay.**
14:08:32 **3 Q.** And did you -- did you determine an error
14:08:39 **4** rate for your analysts' ability to determine
14:08:42 **5** morphology?
14:08:43 **6 A. No.**
14:08:44 **7 Q.** If you did based on this, it would be a
14:08:47 **8** pretty high error rate, wouldn't it?
14:08:49 **9** MS. O'DELL: Object to the form.
14:08:50 **10** THE WITNESS: Well, it's not an error as
14:08:51 **11** to what the material is, is it? It's all
14:08:53 **12** tremolite. It's all tremolite asbestos. It all
14:08:56 **13** meets the definition for tremolite asbestos,
14:08:57 **14** bundle, fiber.
14:08:59 **15 Q.** (By Mr. Chachkes) I'll ask the question
14:09:00 **16** again.
14:09:00 **17 A. Okay.**
14:09:00 **18 Q.** If you were to determine an error rate for
14:09:03 **19** determining the morphology of what the analysts in
14:09:06 **20** the coefficient of variation were looking at, it
14:09:09 **21** would be a very high error rate, wouldn't it?
14:09:11 **22** MS. O'DELL: Object to the form.
14:09:12 **23** THE WITNESS: No. No, it wouldn't.
14:09:12 **24 Q.** (By Mr. Chachkes) Even though they only
14:09:13 **25** agreed once out of 11 times?
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14:09:15 **1** MS. O'DELL: Object to the form.
14:09:16 **2** THE WITNESS: No.
14:09:16 **3 Q.** (By Mr. Chachkes) Why?
14:09:17 **4 A. It's not.**
14:09:18 **5 Q.** Why?
14:09:18 **6 A. Well, the max I can see here is it might**
14:09:23 **7 be -- it might be maybe 50 percent, maybe, if that's**
14:09:28 **8 what it is.**
14:09:28 **9 Q.** Okay.
14:09:29 **10 A. And I don't agree with it, okay, because**
14:09:32 **11 the objective here is is it asbestos? Is it**
14:09:35 **12 asbestiform asbestos? The answer is yes.**
14:09:37 **13 Q.** So a 50 percent error rate in your mind is
14:09:39 **14** not high?
14:09:40 **15** MS. O'DELL: Object to the form.
14:09:41 **16** THE WITNESS: No, this is not --
14:09:43 **17** MS. O'DELL: Give me a moment.
14:09:45 **18** Object to the form.
14:09:46 **19** Go ahead.
14:09:46 **20** THE WITNESS: I mean, again, the objective
14:09:48 **21** here is to determine if this is asbestos, is
14:09:51 **22** this asbestiform. And the answer to that is
14:09:54 **23** yes. You're going to have some variation based
14:09:56 **24** on what they see in the microscope, all right,
14:10:01 **25** and that is totally acceptable.
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14:10:03 **1 Q.** (By Mr. Chachkes) Okay. When you say
14:10:05 **2** totally acceptable, what do you mean by that?
14:10:06 **3 A. Well, it's acceptable based on what the**
14:10:13 **4 asbestiform is, according to the definition. All**
14:10:16 **5 right. Fiber, bundle, .5 or greater, 5-to-1 aspect**
14:10:22 **6 ratio. Every one of these fits that.**
14:10:24 **7 Q.** So -- well, that's not quite correct;
14:10:28 **8** right? A8-G4, three analysts found no detectable
14:10:34 **9** asbestos and only one found asbestos; right?
14:10:36 **10 A. That happens.**
14:10:36 **11 Q.** Okay.
14:10:36 **12 A. That can happen.**
14:10:37 **13 Q.** And then A8-G5, three analysts found no
14:10:41 **14** asbestos and one identified a bundle?
14:10:43 **15 A. Again, that can happen.**
14:10:45 **16 Q.** And you testified before that there's a
14:10:49 **17** right answer and a wrong answer as to whether
14:10:52 **18** something's a fiber or a bundle; right?
14:10:54 **19 A. Yes.**
14:10:54 **20 Q.** Do you know for grid opening A8-E4 which
14:10:59 **21** analyst got it wrong and which analyst got it right?
14:11:01 **22** MS. O'DELL: Object to the form.
14:11:02 **23** THE WITNESS: They both got it right.
14:11:04 **24** They all got it right.
14:11:05 **25 Q.** (By Mr. Chachkes) Okay. And so if
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14:11:08 **1** there's objectively a right answer to whether it's a
14:11:11 **2** fiber or bundle, how can something be both a fiber
14:11:14 **3** and a bundle?
14:11:15 **4** **A. As I say, the analyst, their job is to**
14:11:22 **5 figure out whether it meets the definition, all**
14:11:24 **6 right? Fiber or bundle, it meets the specification**
14:11:28 **7 for whether it is asbestos, asbestiform asbestos.**
14:11:33 **8 Q.** Okay. Putting --
14:11:34 **9 A. That's what we're concerned about here.**
14:11:36 **10 Q.** Putting aside whether there's -- what they
14:11:38 **11 identified as asbestiform, I'm just talking about the**
14:11:41 **12 morphology.**
14:11:41 **13 A. Sure.**
14:11:42 **14 Q.** For A8-E2, two analysts must have gotten
14:11:46 **15 it wrong and two must have gotten it right.**
14:11:48 **16 MS. O'DELL:** Object to the form.
14:11:49 **17 THE WITNESS:** No. They all got it right.
14:11:50 **18 Q.** (By Mr. Chachkes) Okay. So you don't
14:11:50 **19 care whether an analyst correctly identifies**
14:11:54 **20 something as a bundle or fiber?**
14:11:56 **21 MS. O'DELL:** Object to the form.
14:11:56 **22 MS. PARFITT:** Misstates his testimony.
14:11:59 **23 THE WITNESS:** What I've said is it meets
14:12:00 **24 the definition. That's what is of concern to**
14:12:03 **25 me. That's the most important part.**
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14:12:04 **1 Q.** (By Mr. Chachkes) The question is do you
14:12:06 **2 care whether one of your analysts misidentifies a**
14:12:09 **3 bundle as a fiber or a fiber as a bundle?**
14:12:11 **4 MS. O'DELL:** Object to the form.
14:12:13 **5 Q.** (By Mr. Chachkes) Do you care?
14:12:14 **6 MS. O'DELL:** Object to the form.
14:12:15 **7 THE WITNESS:** I care if they identify it
14:12:19 **8 properly according to the regulations, and in**
14:12:22 **9 all cases they have.**
14:12:23 **10 Q.** (By Mr. Chachkes) I'll ask the same
14:12:24 **11 question again.**
14:12:24 **12 A. And I'll answer it the same way every**
14:12:26 **13 time.**
14:12:26 **14 Q.** We'll add this to the list of things we're
14:12:28 **15 going to get the magistrate to --**
14:12:30 **16 A. Fine.**
14:12:30 **17 Q.** -- answer.
14:12:30 **18 A. That's fine.**
14:12:30 **19 Q.** Do you care --
14:12:31 **20 A. I'm going to answer it the same way, so we**
14:12:33 **21 can move on.**
14:12:34 **22 Q.** I want a clear record. If you don't want
14:12:36 **23 to answer -- do you care --**
14:12:37 **24 A. I've answered already.**
14:12:37 **25 MS. O'DELL:** Excuse me. He's answered
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14:12:39 **1** your question.
14:12:39 **2** THE WITNESS: Numerous times.
14:12:41 **3** MS. O'DELL: Excuse me. Three or four
14:12:42 **4** times. If you want to waste your time, but
14:12:45 **5** don't badger the witness.
14:12:46 **6** MR. CHACHKES: I'm not going to badger the
14:12:50 **7** witness --
14:12:50 **8** MS. O'DELL: You are badgering the
14:12:50 **9** witness.
14:12:50 **10** MR. CHACHKES: -- clear answer.
14:12:50 **11** MS. O'DELL: He's answered your question
14:12:51 **12** very clearly.
14:12:52 **13** MR. CHACHKES: I'm going to ask the same
14:12:53 **14** question again. You can tell me I'm not allowed
14:12:56 **15** to, and I'll move on.
14:12:56 **16** MS. O'DELL: I'm telling you that the
14:12:56 **17** rules require that you not badger the witness.
14:12:56 **18** That's what I'm stating to you.
14:13:01 **19** MR. CHACHKES: I'm -- level voice. It's a
14:13:02 **20** calm question. It's a serious question. So.
14:13:04 **21** MS. O'DELL: That doesn't mean you're not
14:13:08 **22** badgering the witness, as you are well aware.
14:13:09 **23** MR. CHACHKES: I believe I'm entitled to a
14:13:11 **24** clear answer to a clear question.
14:13:13 **25** MS. O'DELL: You're not entitled to the
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14:13:13 **1** answer that you want. You're entitled to an
14:13:13 **2** answer, and he's answered your question.
14:13:13 **3** MR. CHACHKES: Let's maybe -- I don't
14:13:13 **4** think this colloquy is productive. I'm going to
14:13:19 **5** ask the same question again. If you want to say
14:13:19 **6** don't ask it, you can order me not to ask it.
14:13:22 **7** I'm going to ask it again.
14:13:23 **8 Q.** (By Mr. Chachkes) Do you care whether
14:13:24 **9** your analysts misidentify a bundle as a fiber or a
14:13:28 **10** fiber as a bundle? Just the morphology I'm talking
14:13:30 **11** about.
14:13:31 **12 A. Asked and answered.**
14:13:32 **13** MS. O'DELL: Excuse me. Object to the
14:13:33 **14** form.
14:13:34 **15 Q.** (By Mr. Chachkes) So you believe you've
14:13:37 **16** already answered that?
14:13:37 **17 A. Yes.**
14:13:38 **18 Q.** Okay. And if I were to say you don't care
14:13:41 **19** about whether an analyst is misidentifying a
14:13:44 **20** morphology, would I be wrong or right?
14:13:46 **21** MS. O'DELL: You would be misstating his
14:13:48 **22** testimony. Object to the question.
14:13:49 **23 Q.** (By Mr. Chachkes) If I said you do care
14:13:52 **24** that an analyst misidentified the morphology of
14:13:56 **25** asbestos, would I be wrong or right?
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14:13:57 **1** MS. O'DELL: Object to the form. He's
14:13:59 **2** answered your question.
14:13:59 **3** THE WITNESS: I've already answered the
14:14:01 **4** question.
14:14:01 **5** MR. CHACHKES: Okay. We're going to add
14:14:03 **6** that to the list of questions for the
14:14:04 **7** magistrate.
14:14:09 **8** **Q.** (By Mr. Chachkes) Does whether you
14:14:12 **9** identify something as a bundle or a fiber affect the
14:14:15 **10** concentration values in your report?
14:14:19 **11** **A.** **No.**
14:14:19 **12** **Q.** Not at all?
14:14:24 **13** **A.** **No.**
14:14:24 **14** **Q.** Does the Rigler 4 demonstrative which is
14:14:32 **15** derived from your coefficient of variation study lead
14:14:36 **16** you to believe that maybe the TEM is not the best
14:14:39 **17** apparatus for resolving morphology?
14:14:41 **18** **A.** **No.**
14:14:42 **19** MS. O'DELL: Object to the form.
14:14:43 **20** THE WITNESS: It is the best.
14:14:45 **21** **Q.** (By Mr. Chachkes) No evidence will shake
14:14:46 **22** you from that opinion?
14:14:47 **23** **A.** **No.**
14:14:47 **24** **Q.** Okay. Let's talk about asbestos. Ready?
14:14:56 **25** **A.** **I thought that's what we've been talking**
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14:14:58 **1** **about.**
14:14:58 **2** **Q.** Completely different topic.
14:14:59 **3** **A.** **All right.**
14:15:00 **4** **Q.** You talk about the Blount paper in your
14:15:02 **5** expert report; correct?
14:15:04 **6** **A.** **Yes.**
14:15:04 **7** **Q.** Okay. In the Blount paper there's a
14:15:06 **8** particle size distribution?
14:15:09 **9** **A.** **Yes.**
14:15:09 **10** **Q.** Okay. And out in the published literature
14:15:16 **11** there are publications that have particle sized
14:15:21 **12** distributions that -- strike that.
14:15:25 **13** That there's a characteristic -- there is
14:15:27 **14** a characteristic particle size distribution for
14:15:30 **15** asbestos; is that correct?
14:15:31 **16** **A.** **Well, depending on how that sample's been**
14:15:43 **17** **processed, you're going to have different fiber**
14:15:45 **18** **sizes, different -- they're going to be different.**
14:15:48 **19** **You're going to have different aspect ratios and**
14:15:51 **20** **different sizes.**
14:15:51 **21** **Q.** For any given sample that everyone agrees
14:15:56 **22** is asbestos, it's going to have a characteristic
14:15:59 **23** particle size distribution; right?
14:16:00 **24** MS. O'DELL: Object to the form.
14:16:01 **25** THE WITNESS: It can.
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14:16:02 **1** **Q.** (By Mr. Chachkes) Okay. Meaning some
14:16:06 **2** of -- strike that.
14:16:06 **3** Does a -- you understand what a cleavage
14:16:10 **4** fragment is?
14:16:11 **5** **A.** **Yes.**
14:16:11 **6** **Q.** Would you call a cleavage fragment
14:16:13 **7** asbestos?
14:16:13 **8** **A.** **If it was of the size and shape that met**
14:16:16 **9** **the regulatory definition, yes.**
14:16:18 **10** **Q.** Do cleavage fragments have a different
14:16:21 **11** particle size distribution than asbestos?
14:16:26 **12** MS. O'DELL: Object on the form.
14:16:27 **13** THE WITNESS: They can.
14:16:29 **14** **Q.** (By Mr. Chachkes) Okay. Using -- when I
14:16:31 **15** say geological definition, I've heard you guys talk
14:16:34 **16** about --
14:16:34 **17** **A.** **Yes.**
14:16:34 **18** **Q.** -- I'm going to use your phrase geological
14:16:37 **19** definition of asbestos.
14:16:39 **20** **A.** **All right.**
14:16:39 **21** **Q.** Using a geological definition of asbestos,
14:16:42 **22** can you have a cleavage fragment that is greater than
14:16:46 **23** 5-to-1 aspect ratio?
14:16:48 **24** MS. O'DELL: Object to the form.
14:16:49 **25** THE WITNESS: In my opinion, the answer to
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14:16:52 **1** that is yes.
14:16:53 **2** **Q.** (By Mr. Chachkes) Okay. And using the
14:16:56 **3** geological definition of asbestos as you have used
14:17:02 **4** it, there can be an asbestiform particle that has an
14:17:06 **5** aspect ratio of below 3-to-1?
14:17:08 **6** MS. O'DELL: Object to the form.
14:17:10 **7** THE WITNESS: Are you talking about what
14:17:13 **8** kind of particle?
14:17:14 **9** **Q.** (By Mr. Chachkes) Asbestiform particle.
14:17:15 **10** **A.** **Smaller than 3-to-1?**
14:17:17 **11** **Q.** Yeah.
14:17:17 **12** **A.** **I mean, from a regulatory standpoint, it**
14:17:22 **13** **would be 3-to-1, 5-to-1. So --**
14:17:27 **14** **Q.** Yeah. I don't want to interrupt.
14:17:29 **15** So for just a geological definition as
14:17:31 **16** you've -- as --
14:17:34 **17** **A.** **Yeah.**
14:17:34 **18** **Q.** It's just a geological definition as you
14:17:39 **19** have used that phrase, can there be, under the
14:17:42 **20** geological definition, asbestos with an aspect ratio
14:17:45 **21** below 3-to-1?
14:17:46 **22** MS. O'DELL: Object to the form.
14:17:47 **23** THE WITNESS: Well, the geological
14:17:51 **24** definition that we've talked about has to do
14:17:54 **25** with macro, large, very large that you can hold
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14:17:58 **1** in your hand kinds of particles. So in most
14:18:03 **2** cases of that size, you know, you may see some
14:18:08 **3** that are in that range, but you have to use the
14:18:09 **4** PLM to see them, probably.
14:18:11 **5** **Q.** (By Mr. Chachkes) Okay. If I took, under
14:18:14 **6** the geological definition, a tremolite particle that
14:18:17 **7** had a 6-to-1 aspect ratio and I snapped it into two
14:18:21 **8** 3-to-1 aspect ratio particles, under the geological
14:18:24 **9** definition those two particles would still be
14:18:27 **10** asbestos; right?
14:18:28 **11** **A.** **Yes. I mean, if they were -- yeah. They**
14:18:32 **12** **were on a -- yes, they would be.**
14:18:34 **13** **Q.** Let me ask it --
14:18:35 **14** **A.** **If they were equally divided.**
14:18:36 **15** **Q.** Yeah. Let me just ask a better question
14:18:38 **16** to be fair.
14:18:39 **17** If I had a tremolite particle that was --
14:18:42 **18** that had a 6-to-1 aspect ratio and I snapped it into
14:18:46 **19** three parts perfectly evenly so that each had a
14:18:50 **20** 2-to-1 aspect ratio, under the geological definition
14:18:53 **21** each of those would still be asbestos; right?
14:18:54 **22** MS. O'DELL: Object to the form.
14:18:56 **23** THE WITNESS: On a microscopic scale they
14:18:58 **24** wouldn't be. I mean, they wouldn't fit the
14:19:00 **25** regulatory definition.
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14:19:00 **1** **Q.** (By Mr. Chachkes) I'm talking about the
14:19:01 **2** geological.
14:19:02 **3** **A.** **I mean --**
14:19:08 **4** MS. O'DELL: Object to the form.
14:19:09 **5** THE WITNESS: Yeah, I don't -- I mean, I
14:19:11 **6** think on a microscale versus, you know, what I
14:19:14 **7** can see in my hand. See what I'm saying?
14:19:17 **8** **Q.** (By Mr. Chachkes) No.
14:19:18 **9** **A.** **Yeah. Well, that's how I feel about the**
14:19:22 **10** **question you just asked me. I'm not quite sure of**
14:19:24 **11** **exactly -- I mean, I understand what the concept is,**
14:19:28 **12** **but when you're saying on a geological scale, I mean,**
14:19:32 **13** **if the aspect ratio is less than 3-to-1, it wouldn't**
14:19:35 **14** **come under the regulatory definition.**
14:19:37 **15** **Q.** Right. But I'm not asking about
14:19:38 **16** regulatory.
14:19:39 **17** **A.** **Well, that's where I am with it.**
14:19:41 **18** **Q.** Right.
14:19:43 **19** **A.** **I mean, if you're going to say it's**
14:19:45 **20** **asbestiform, it's got to have that ratio. It's got**
14:19:50 **21** **to have at least a 5-to-1 ratio.**
14:19:52 **22** **Q.** So if I have a chunk of gold and I break
14:19:54 **23** it in half, each half would still be gold; right?
14:19:57 **24** **A.** **Yeah.**
14:19:57 **25** **Q.** If I break those two halves again, each
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14:20:00 **1** part would still be gold?
14:20:01 **2** **A.** **Correct.**
14:20:01 **3** **Q.** And I can keep going doing that until I
14:20:05 **4** had very small pieces and they still would be gold?
14:20:07 **5** **A.** **Sure.**
14:20:08 **6** **Q.** You're saying the same does not apply to
14:20:10 **7** asbestos, that I could break asbestos and at a
14:20:11 **8** certain point it's not asbestos?
14:20:11 **9** MS. O'DELL: Object to the form.
14:20:12 **10** THE WITNESS: Well, I mean, chemically it
14:20:15 **11** still is. Yes.
14:20:17 **12** **Q.** (By Mr. Chachkes) Okay. You use -- so I
14:20:26 **13** didn't see the phrase asbestiform talc in your
14:20:28 **14** report; is that correct?
14:20:30 **15** **A.** **I don't -- it might be in there, yeah, I**
14:20:33 **16** **think it is. Yeah.**
14:20:34 **17** **Q.** Okay. In your report at page 8 you talk
14:20:37 **18** about fibrous talc, you found fibrous talc in
14:20:42 **19** 98 percent of the Italian and Vermont talc samples by
14:20:45 **20** ISO 22262. Does that ring a bell?
14:20:48 **21** **A.** **Yes.**
14:20:48 **22** **Q.** What is your definition of fibrous talc?
14:20:50 **23** **A.** **It would be talc that had that aspect**
14:20:52 **24** **ratio of 5-to-1.**
14:20:53 **25** **Q.** You would require parallel sides as well?
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14:20:56 **1** **A.** **Yes.**
14:20:56 **2** **Q.** Is there a scientific consensus that there
14:21:01 **3** is such a thing as fibrous talc?
14:21:02 **4** **A.** **Yes.**
14:21:02 **5** **Q.** Are you aware of any epidemiologist or
14:21:07 **6** doctor who has studied the health effects of fibrous
14:21:09 **7** talc?
14:21:10 **8** MS. O'DELL: Object to the form.
14:21:11 **9** THE WITNESS: Well, if the talc -- if
14:21:18 **10** there's fibrous talc in with -- let's just say
14:21:22 **11** we called it talc, whether it's got a fibrous
14:21:24 **12** component or not, platy, you know, mostly platy.
14:21:30 **13** As far as IARC is concerned, they say that that
14:21:35 **14** is -- that will be -- if it has asbestos in it,
14:21:38 **15** it's going to be regulated and hazardous to
14:21:44 **16** health.
14:21:44 **17** **Q.** (By Mr. Chachkes) The question was are
14:21:45 **18** you aware of any epidemiologist or doctor who has
14:21:48 **19** studied the health effects of fibrous talc?
14:21:51 **20** MS. O'DELL: Object to the form.
14:21:53 **21** **Q.** (By Mr. Chachkes) It's a yes or no
14:21:54 **22** question.
14:21:54 **23** **A.** **Yes, there have been numerous studies on**
14:21:59 **24** **fibrous talc, and I don't know if they're in some of**
14:22:04 **25** **our reference material or not, but there have been**
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14:22:05 **1 numerous studies that have been done.**
14:22:07 **2 Q.** Can you name a single doctor or
14:22:09 **3** epidemiologist who has done a study on the health
14:22:11 **4** effects of fibrous talc --
14:22:13 **5** MS. O'DELL: Object to the form --
14:22:14 **6** THE WITNESS: Are you talking about
14:22:15 **7** medical doctors, Ph.D.s, what? You said doctor.
14:22:18 **8 Q.** (By Mr. Chachkes) Let's say medical
14:22:20 **9** doctor.
14:22:20 **10 A. Yeah, let's say doctors like you said**
14:22:22 **11 before, then yes, there are.**
14:22:23 **12 Q.** Okay. Start with medical doctors.
14:22:25 **13 A. Okay.**
14:22:30 **14 Q.** Can you name a medical doctor who has
14:22:30 **15** studied the health effects of fibrous talc?
14:22:30 **16 A. There are --**
14:22:31 **17** MS. O'DELL: Object to the form.
14:22:31 **18** THE WITNESS: I can't name one right now
14:22:35 **19** as I sit here, but there are that have done
14:22:36 **20** those studies.
14:22:37 **21 Q.** (By Mr. Chachkes) Can you name an
14:22:38 **22** epidemiologist?
14:22:39 **23** MS. O'DELL: Object to the form.
14:22:40 **24** THE WITNESS: There are ones that have.
14:22:41 **25 Q.** (By Mr. Chachkes) Can you name one?
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14:22:42 **1 A. No, not as I sit here right here.**
14:22:44 **2 Q.** Can you name just a general doctor who has
14:22:46 **3** studied the health effects of fibrous talc?
14:22:49 **4** MS. O'DELL: Object to the form.
14:22:49 **5** THE WITNESS: It's the same answer to the
14:22:51 **6** question. Doctor, doctor.
14:22:52 **7 Q.** (By Mr. Chachkes) Okay. Well, there's
14:22:53 **8** medical doctor and regular -- and other -- like
14:22:53 **9** you're a doctor --
14:22:53 **10 A. Well --**
14:22:53 **11** THE REPORTER: Wait. Wait.
14:22:58 **12** THE WITNESS: I know, but we said doctors.
14:23:02 **13 Q.** (By Mr. Chachkes) But sitting here today
14:23:03 **14** you can't name just a Ph.D. who has studied -- just
14:23:06 **15** by name -- a Ph.D. who has studied the health effects
14:23:09 **16** of fibrous talc -- exposure to fibrous talc?
14:23:10 **17** MS. O'DELL: Object to form.
14:23:12 **18** THE WITNESS: As I sit right here, I can't
14:23:14 **19** name them, but they do exist. I have reference
14:23:17 **20** material and I'd be happy to get that for you.
14:23:20 **21 Q.** (By Mr. Chachkes) Can you identify --
14:23:21 **22 A. Would you like to have that material?**
14:23:23 **23 Would you like to have that --**
14:23:24 **24 Q.** This deposition doesn't work if you ask
14:23:26 **25** questions back to me.
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14:23:27 **1 A. I understand. I understand.**
14:23:27 **2 Q.** Can you identify any published authority
14:23:29 **3** for your definition of fibrous talc?
14:23:31 **4 A. Sure.**
14:23:31 **5 Q.** What?
14:23:32 **6 A. I would want to say EPA right now.**
14:23:46 **7 Q.** Any other?
14:23:47 **8 A. I'd have to think about that.**
14:23:50 **9 Q.** Specifically what EPA document?
14:23:53 **10 A. I'll have to find that for you. Be happy**
14:23:58 **11 to find that.**
14:23:58 **12 Q.** In the method in the 22262 method that you
14:24:04 **13** used in your report, does it use the phrase fibrous
14:24:08 **14** talc?
14:24:08 **15 A. I don't recall. I'd have to look through**
14:24:10 **16 it.**
14:24:11 **17 Q.** Does it use the phrase asbestiform talc?
14:24:13 **18 A. Same answer.**
14:24:14 **19 Q.** Do you think those phrases are in there?
14:24:17 **20 A. I would have to look.**
14:24:18 **21 Q.** Are fibrous talc and asbestiform talc
14:24:24 **22** different?
14:24:25 **23 A. Fibrous talc and asbestiform talc, if it**
14:24:29 **24 meets the definition, it would be considered**
14:24:31 **25 asbestiform talc, and you could still call it fibrous**
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14:24:34 **1 talc.**
14:24:35 **2 Q.** Are they --
14:24:35 **3 A. So they could be one and the same.**
14:24:37 **4 Q.** Could they be one and the same --
14:24:39 **5 A. Let's say they are. If they meet the**
14:24:41 **6 definition, then they are.**
14:24:43 **7 Q.** So the two phrases are synonymous?
14:24:46 **8 A. If they meet the specifications for the**
14:24:48 **9 regulated fiber, the definition, than they are.**
14:24:50 **10 Q.** Is there a situation where fibrous talc
14:24:53 **11** and asbestiform talc aren't the same?
14:24:56 **12** MS. O'DELL: Object to the form.
14:24:57 **13** THE WITNESS: Again, if they don't meet
14:24:58 **14** the aspect ratio, then they wouldn't be the
14:25:03 **15** same.
14:25:03 **16 Q.** (By Mr. Chachkes) Well, then they
14:25:04 **17** wouldn't be fibrous talc and asbestiform --
14:25:06 **18 A. Sure. They could be --**
14:25:06 **19** MS. O'DELL: Object to the form.
14:25:09 **20** THE WITNESS: -- fibrous at 4-to-1,
14:25:09 **21** 3-to-1, 2-to-1. Sure. They will have a fibrous
14:25:13 **22** form.
14:25:13 **23 Q.** (By Mr. Chachkes) So you're saying that
14:25:14 **24** if there's -- you could have fibrous talc at a 2-to-1
14:25:18 **25** aspect ratio, but it would not be asbestiform talc?
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14:25:21 **1** **A. Correct.**
14:25:21 **2** **Q.** Are there two kinds of tremolite,
14:25:34 **3** asbestiform and nonasbestiform?
14:25:36 **4** **A. Yes.**
14:25:36 **5** **Q.** Just identifying something as tremolite
14:25:41 **6** doesn't mean it's asbestiform?
14:25:43 **7** MS. O'DELL: Object to the form.
14:25:44 **8** THE WITNESS: It can be massive tremolite.
14:25:47 **9** You know, if it's fibrous and it meets the
14:25:49 **10** definition, then it's going to be asbestiform.
14:25:51 **11** I mean, according to the definition.
14:25:53 **12** **Q.** (By Mr. Chachkes) The question is just
14:25:54 **13** identifying something as tremolite does not mean it's
14:25:56 **14** asbestiform; is that correct?
14:25:57 **15** MS. O'DELL: Object to the form.
14:25:58 **16** THE WITNESS: Once again, you would have
14:26:02 **17** to look at the form.
14:26:03 **18** **Q.** (By Mr. Chachkes) To determine whether
14:26:04 **19** it's asbestiform?
14:26:05 **20** **A. Yes.**
14:26:06 **21** MS. O'DELL: Object to the form.
14:26:07 **22** **Q.** (By Mr. Chachkes) Just identifying
14:26:08 **23** something as anthophyllite doesn't mean it's
14:26:10 **24** asbestiform; correct?
14:26:11 **25** MS. O'DELL: Object to the form.
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14:26:12 **1** THE WITNESS: Once again, if it meets the
14:26:15 **2** definition than it would be.
14:26:17 **3** **Q.** (By Mr. Chachkes) Okay. And if it
14:26:19 **4** doesn't meet the definition, it wouldn't be?
14:26:21 **5** MS. O'DELL: Object to the form.
14:26:22 **6** THE WITNESS: Well, it's still
14:26:23 **7** anthophyllite. It may be, you know, below the
14:26:26 **8** aspect ratio again. Causes the same health
14:26:30 **9** effects.
14:26:30 **10** **Q.** (By Mr. Chachkes) What's a cleavage
14:26:36 **11** fragment again?
14:26:36 **12** MS. O'DELL: Asked and answered.
14:26:38 **13** THE WITNESS: Yeah. Talked about that
14:26:39 **14** already.
14:26:39 **15** **Q.** (By Mr. Chachkes) So what is it?
14:26:41 **16** **A. It is a -- it's a form that would not have**
14:26:45 **17** **parallel sides. Wouldn't have the aspect ratio.**
14:26:49 **18** **It's going to be an odd shape.**
14:26:50 **19** **Q.** Is something that had nonparallel sides
14:26:55 **20** with an aspect ratio of 6-to-1, would that be a
14:26:59 **21** cleavage fragment?
14:27:00 **22** MS. O'DELL: Object to the form.
14:27:01 **23** THE WITNESS: Most likely.
14:27:02 **24** **Q.** (By Mr. Chachkes) Do you agree with the
14:27:03 **25** statement: Crushing of nonasbestiform amphibole can
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14:27:06 **1** lead to elongate fragments that conform to the
14:27:09 **2** definition of an asbestiform fiber?
14:27:11 **3** MS. O'DELL: Object to form.
14:27:12 **4** THE WITNESS: Yes.
14:27:12 **5** **Q.** (By Mr. Chachkes) Do you agree with this
14:27:13 **6** statement: Crushed nonasbestiform amphiboles rarely
14:27:17 **7** have aspect ratios exceeding 30-to-1?
14:27:21 **8** **A. I mean, that is -- that's been stated, but**
14:27:29 **9** **it's as rarely -- so it's not 100 percent. So you**
14:27:35 **10** **can have some.**
14:27:35 **11** **Q.** But you agree with the statement?
14:27:38 **12** MS. O'DELL: Object to the form. He just
14:27:40 **13** said what he thought about the statement.
14:27:41 **14** THE WITNESS: Yeah.
14:27:41 **15** **Q.** (By Mr. Chachkes) It's yes or no. Do
14:27:43 **16** crushed -- do you agree with this statement, yes or
14:27:45 **17** no: Crushed nonasbestiform amphiboles rarely have
14:27:48 **18** aspect ratios exceeding 30-to-1?
14:27:50 **19** MS. O'DELL: You may answer it any way
14:27:52 **20** you'd like, Doctor. You're not restricted.
14:27:54 **21** THE WITNESS: I mean, I've already
14:27:55 **22** answered part of the question, and I would say
14:27:56 **23** yes, you know.
14:28:00 **24** MS. O'DELL: We have been going about an
14:28:01 **25** hour. Why don't we take a quick break.
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14:28:04 **1** MR. CHACHKES: Sure.
14:28:43 **2** (Recess from 2:28 p.m. to 2:52 p.m.)
3 (Defendants' Exhibit 1 was marked for
14:52:54 **4** identification.)
14:52:54 **5** **Q.** (By Mr. Chachkes) Okay. Dr. Rigler, this
14:53:11 **6** has already been marked as Rigler Exhibit 1. Can you
14:53:15 **7** confirm that those are MAS invoices?
14:53:17 **8** **A. Let's see. It has MAS on the letterhead.**
14:53:26 **9** **They look like they are, yep.**
14:53:29 **10** **Q.** Okay. It looks like the first page is an
14:53:31 **11** April invoice. Am I right there?
14:53:33 **12** **A. April 8 to April 11, 2018.**
14:53:38 **13** **Q.** Okay. And it looks like the second one on
14:53:42 **14** page 2 is a March invoice?
14:53:44 **15** **A. Let's see. Yes.**
14:53:46 **16** **Q.** And then page 3 looks like a single block
14:53:50 **17** billing for, I'm guessing, the report, the
14:53:56 **18** November 15 report?
14:53:56 **19** **A. I don't know. I have no idea. First time**
14:53:59 **20** **I've seen these.**
14:53:59 **21** **Q.** Okay.
14:54:00 **22** **A. Yeah, so I don't know.**
14:54:01 **23** **Q.** Okay. So you wouldn't know whether
14:54:03 **24** there's other billing --
14:54:04 **25** **A. I have no idea.**
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14:54:05 **1** Q. And you don't know whether there's
14:54:07 **2** underlying documents that support these?
14:54:09 **3** A. **I don't know.**
14:54:10 **4** Q. And you don't --
14:54:11 **5** A. **Have to ask Dr. Longo.**
14:54:12 **6** Q. Okay. And you don't know what the block
14:54:14 **7** billing is for on number 3?
14:54:15 **8** A. **No.**
14:54:16 **9** Q. The third page, that is?
14:54:17 **10** A. **No, I don't.**
14:54:18 **11** Q. Do you know why the number 14 appears on
14:54:22 **12** the third page?
14:54:23 **13** A. **That would be the department number.**
14:54:26 **14** Q. It's your department?
14:54:27 **15** A. **14, yes.**
14:54:28 **16** Q. And what's that called?
14:54:31 **17** A. **I think it's called legal.**
14:54:33 **18** Q. Okay. So you're in legal?
14:54:34 **19** A. **Yes.**
14:54:35 **20** Q. Are you in any other departments?
14:54:36 **21** A. **No.**
14:54:37 **22** Q. Is Dr. Longo in legal?
14:54:39 **23** A. **Yes.**
14:54:39 **24** Q. Is he in any other departments?
14:54:41 **25** A. **Well, he is the departments.**

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14:55:25 **1** A. **I guess it does.**
14:55:27 **2** Q. Okay.
14:55:27 **3** A. **I just give them the hours.**
14:55:29 **4** Q. Okay. I'm done with that one.
14:55:34 **5** A. **All right.**
14:55:34 **6** MR. CHACHKES: I still have a request
14:55:35 **7** pending for billing.
14:55:37 **8** MS. O'DELL: That's what I have in my
14:55:39 **9** possession.
10 MR. CHACHKES: Okay.
14:55:39 **11** MS. O'DELL: If we receive any others,
14:55:41 **12** I'll let you know.
14:55:43 **13** Q. (By Mr. Chachkes) Okay. Can you pull up
14:55:50 **14** Exhibit 5, which is, I think, if I've got it right,
14:56:04 **15** 22262-2.
14:56:14 **16** MR. SILVER: Alex, just for the record,
14:56:16 **17** when you say exhibit numbers, these are exhibits
14:56:17 **18** to the depo of Dr. Longo that happened on
14:56:21 **19** February 5 of 2019?
14:56:23 **20** MR. CHACHKES: Correct. And a good
14:56:24 **21** clarification.
14:56:24 **22** Q. (By Mr. Chachkes) So this is Exhibit 5 to
14:56:28 **23** yesterday's Longo deposition, if you can --
14:56:29 **24** A. **I don't have that.**
14:56:30 **25** Q. It's probably in this stack. I'll help

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1 Q. Oh, okay.
14:54:44 **2** A. **He's MAS.**
14:54:44 **3** Q. Is he in every department, 1 through
14:54:47 **4** whatever?
14:54:47 **5** A. **I would say yes to that, but you need to**
14:54:50 **6** **ask him about that.**
14:54:50 **7** Q. What is the department called legal? What
14:54:52 **8** is it?
14:54:53 **9** A. **14. It just says 14.**
14:54:54 **10** Q. No, I mean substantively, what does legal
14:54:58 **11** do? Why is there a group called legal?
14:55:01 **12** A. **It's just called. I don't know. That's**
14:55:02 **13** **what they've always called it.**
14:55:03 **14** Q. Does it do all the work that is for
14:55:06 **15** litigations?
14:55:07 **16** A. **I don't --**
14:55:09 **17** MS. O'DELL: Object to form.
18 THE WITNESS: -- know. You'd have to ask
14:55:11 **19** Dr. Longo. Because they came up with the
14:55:13 **20** numbers and designations.
14:55:14 **21** Q. (By Mr. Chachkes) When you do work that
14:55:16 **22** is billable to, let's say, a company that's not
14:55:21 **23** involved in litigation, does that go through unit 14?
14:55:24 **24** A. **For me?**
14:55:25 **25** Q. Yes.

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14:56:32 **1** you find it.
14:56:40 **2** MS. O'DELL: Are you referring to 22262-2?
14:56:42 **3** MR. CHACHKES: Part 2, yes.
4 MS. O'DELL: Part 2.
14:56:45 **5** MR. CHACHKES: Dash 2. Okay.
14:56:51 **6** MS. O'DELL: I think I gave you mine.
7 MR. CHACHKES: That one's his. It's got
14:56:58 **8** the stamp on it.
9 MS. O'DELL: It does, but I think I gave
10 him mine earlier.
11 THE WITNESS: Yeah, I think you did. It's
12 in there. She has it, hers.
14:56:59 **13** Q. (By Mr. Chachkes) Okay.
14:56:59 **14** A. **There we go.**
14:57:02 **15** Q. Can you turn to page -- well, do you see
14:57:06 **16** where there's a section 3, Terms and Definitions,
14:57:10 **17** it's very near the front?
14:57:12 **18** A. **Yes.**
14:57:12 **19** Q. And there's a definition for asbestiform
14:57:14 **20** that's 3.5?
14:57:22 **21** A. **Yes.**
14:57:23 **22** Q. And do you see where there's a definition
14:57:25 **23** for asbestos, 3.6?
14:57:26 **24** A. **Yes.**
14:57:27 **25** Q. You didn't apply -- when you talk about

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14:57:36 **1** asbestos in your report, it's not the definition of
14:57:40 **2** asbestos that's in 3.6; correct?
14:57:43 **3** MS. O'DELL: Object to the form.
14:57:44 **4** THE WITNESS: Yeah. The 3.6 definition is
14:57:49 **5** the one that we say is -- this is a geological
14:57:54 **6** definition.
14:57:54 **7** **Q.** (By Mr. Chachkes) Right. And so my
14:57:55 **8** question is when I read the word asbestos in your
14:57:57 **9** report, it's not the 3.6 definition in this
14:58:02 **10** Exhibit 5; right?
14:58:03 **11** MS. O'DELL: Object to the form.
14:58:04 **12** THE WITNESS: It is based on the
14:58:08 **13** regulatory definition.
14:58:09 **14** **Q.** (By Mr. Chachkes) And the same question:
14:58:11 **15** Is it the -- it's different from the definition in
14:58:15 **16** 3.6; correct?
14:58:16 **17** **A.** The regulatory definition?
14:58:18 **18** **Q.** The definition you're looking at right in
14:58:20 **19** front of you --
14:58:21 **20** **A.** Yes.
14:58:21 **21** **Q.** -- that's 3.6?
14:58:22 **22** **A.** Yes.
14:58:22 **23** **Q.** So in your report when you use asbestos,
14:58:24 **24** it's different than 3.6?
14:58:26 **25** MS. O'DELL: Object to the form.
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14:58:27 **1** Go ahead.
14:58:29 **2** THE WITNESS: The regulatory definition,
14:58:32 **3** again, depending upon the document that you look
14:58:34 **4** at, will include some of this language. For
14:58:37 **5** instance, the EPA includes some of this same
14:58:41 **6** language that's in 3.6, so you'll have some
14:58:43 **7** overlap there.
14:58:44 **8** **Q.** (By Mr. Chachkes) I'm not asking about
14:58:45 **9** overlap.
14:58:46 **10** Can I assume that whenever you use the
14:58:47 **11** phrase asbestos in your report you mean verbatim what
14:58:50 **12** is in 3.6 that's right in front of you?
14:58:53 **13** MS. O'DELL: Object to the form. That's
14:58:55 **14** not what he said.
14:58:56 **15** THE WITNESS: I hear what you're saying.
14:59:00 **16** Again, the regulatory definitions by standard
14:59:07 **17** groups, such as EPA, ASTM, they have this
14:59:16 **18** language in their definition, all right. So
14:59:20 **19** there's an overlap there.
14:59:21 **20** If you want to say we don't do that, what
14:59:24 **21** I would say is there is an overlap there, but
14:59:28 **22** this is a geological definition, and we -- you
14:59:35 **23** can't measure this flexibility and strength at
14:59:37 **24** the level of the structures that we're looking
14:59:40 **25** at.
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14:59:40 **1** **Q.** (By Mr. Chachkes) Okay.
14:59:41 **2** **A.** So I hope I've answered your question.
14:59:43 **3** **Q.** I thought it was a simple question, so I
14:59:45 **4** guess I have to ask it again.
14:59:46 **5** But, I mean, when you say there is
14:59:50 **6** asbestos in your report in J&J's bottles of cosmetic
14:59:56 **7** talc, do you mean to say that it contains a group of
14:59:59 **8** silicate materials belonging to the serpentine and
15:00:02 **9** amphibole groups which have crystallized in the
15:00:05 **10** asbestiform habit, causing them to be easily
15:00:08 **11** separated into long, thin, flexible, strong fibers
15:00:12 **12** when crushed or processed?
15:00:14 **13** **A.** If -- again, you know, we go by what's in
15:00:21 **14** the definition, the regulatory definition. And
15:00:24 **15** again, that does overlap -- some of the wording in
15:00:30 **16** those regulatory documents overlap what's in here
15:00:35 **17** too. So that would be applicable, if that helps
15:00:38 **18** answer the question.
15:00:39 **19** **Q.** I think you know what the question is.
15:00:41 **20** It's a very simple one.
15:00:42 **21** Is that your definition of asbestos in
15:00:44 **22** your report?
15:00:45 **23** MS. O'DELL: Object to the form.
15:00:46 **24** **Q.** (By Mr. Chachkes) Yes or no?
15:00:48 **25** MS. O'DELL: Object to the form --
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15:00:49 **1** THE WITNESS: Part of it is.
15:00:50 **2** MS. O'DELL: -- ask --
15:00:50 **3** **Q.** (By Mr. Chachkes) -- which part isn't?
15:00:51 **4** THE REPORTER: Wait.
15:00:51 **5** MS. O'DELL: Asked and answered.
15:00:56 **6** THE WITNESS: The strong fibers, the long,
15:01:00 **7** flexible, strong fibers portion of it.
15:01:01 **8** **Q.** (By Mr. Chachkes) Okay. You have not
15:01:02 **9** determined that J&J talc -- one way or the other,
15:01:06 **10** whether it is or isn't, you haven't done a
15:01:09 **11** determination of what you're calling asbestos in J&J
15:01:12 **12** talc is easily separated into long, thin, flexible,
15:01:16 **13** strong fibers when crushed or processed?
15:01:18 **14** MS. O'DELL: Object to form.
15:01:19 **15** THE WITNESS: I don't know how we would do
15:01:20 **16** that.
15:01:20 **17** **Q.** (By Mr. Chachkes) Okay. And can you turn
15:01:24 **18** to the next page, to cleavage fragment. Is that the
15:01:28 **19** definition of cleavage fragment in 3.12 that you use
15:01:32 **20** in your report?
15:01:33 **21** **A.** I don't believe we're -- ask the question
15:01:38 **22** again. Is that what we use in our report?
15:01:40 **23** **Q.** Let me take a step back.
15:01:42 **24** **A.** Is that the --
15:01:42 **25** **Q.** Do you use the phrase cleavage fragment in
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15:01:45 **1** your report?
15:01:46 **2** MS. O'DELL: Object to form.
3 THE WITNESS: We have used cleavage in our
15:01:48 **4** report.
15:01:48 **5** **Q.** (By Mr. Chachkes) Okay. Cleavage
15:01:49 **6** fragment?
15:01:49 **7** **A.** I want to say yes to that.
8 **Q.** Okay.
15:01:51 **9** **A.** I'd have to look, but I believe so, yes.
15:01:53 **10** **Q.** When I read cleavage fragment in your
15:01:55 **11** report, is it the definition I'm reading in 3.12?
15:01:59 **12** **A.** We would, again, refer to how it was --
15:02:06 **13** that it didn't meet the regulatory definition of
15:02:09 **14** parallel sides, less than 1/2 a micron, 5-to-1 aspect
15:02:13 **15** ratio.
15:02:14 **16** **Q.** Okay. And you would say that in your
15:02:18 **17** report, something that is a fragment of a crystal
15:02:23 **18** that is bounded by cleavage faces is not a cleavage
15:02:27 **19** fragment if it has an aspect ratio of greater than
15:02:29 **20** 5-to-1?
15:02:30 **21** MS. O'DELL: Object to form.
15:02:31 **22** THE WITNESS: Correct. If it had the
15:02:32 **23** defining characteristics of the regulatory
15:02:34 **24** definition.
15:02:39 **25** MR. CHACHKES: Okay. No further
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15:02:41 **1** questions.
15:02:42 **2** Subject to the same objection and
15:02:46 **3** complaint we had yesterday about late produced
15:02:49 **4** documents, I'll pass the witness.
15:02:52 **5** MS. O'DELL: You know our position. We
15:02:53 **6** don't believe they're late produced.
15:02:55 **7** MR. CHACHKES: I thought you were agreeing
15:02:56 **8** it was late produced, no?
15:02:56 **9** MS. O'DELL: I just wanted to make sure
15:02:58 **10** you didn't think my silence was acquiescence.
15:03:00 **11** We're opposed.
15:03:03 **12** EXAMINATION
15:03:04 **13** BY MR. SILVER:
15:03:05 **14** **Q.** Good afternoon, Dr. Rigler. My name is
15:03:05 **15** Mark Silver. I am representing Imerys Talc America.
15:03:06 **16** I only have a couple of questions for you.
15:03:09 **17** With my questions, after I ask them, make
15:03:10 **18** sure that your attorneys have a chance to respond.
15:03:13 **19** There are some based on off-record conversations they
15:03:16 **20** may or may not instruct you to answer and/or you
15:03:19 **21** won't feel comfortable answering.
15:03:21 **22** We're going to do what's known as making a
15:03:22 **23** record so that we can have a collegial disagreement
15:03:26 **24** at some hopefully later date and not today, but we'll
15:03:28 **25** see how it goes.
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15:03:30 **1** The first one is easy. I just want to
15:03:30 **2** make sure that I understand an answer you gave
15:03:32 **3** earlier.
15:03:35 **4** It was my understanding that you were
15:03:36 **5** asked by Mr. Chachkes about whether you were working
15:03:39 **6** on something that you intended to be published in
15:03:43 **7** peer-reviewed literature relating to talc, and you
15:03:45 **8** responded you could not confirm or deny.
15:03:47 **9** Is that an accurate summarization of your
15:03:50 **10** testimony?
15:03:50 **11** **A.** That is what I said.
15:03:51 **12** **Q.** Okay. And my understanding is you cannot
15:03:53 **13** confirm or deny because you and/or MAS believe that
15:03:58 **14** work, if it exists, would be proprietary; is that
15:04:01 **15** correct?
15:04:01 **16** **A.** And it's our policy also.
15:04:03 **17** **Q.** Okay. So that work --
15:04:06 **18** **A.** Yes.
15:04:06 **19** **Q.** Is there a written policy on what MAS
15:04:09 **20** considers proprietary?
15:04:09 **21** **A.** That's Dr. Longo's policy, so you'll have
15:04:11 **22** to discuss that with him.
15:04:12 **23** **Q.** Okay. But have you ever seen a written
15:04:14 **24** policy on it?
15:04:15 **25** **A.** I don't recall seeing one. But again,
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15:04:19 **1** talk to Dr. Longo.
15:04:20 **2** **Q.** Okay. But your understanding, because
15:04:22 **3** you're the one -- right now, your understanding is
15:04:24 **4** it's proprietary, and you got that understanding from
15:04:26 **5** a conversation with Dr. Longo?
15:04:28 **6** **A.** It is proprietary --
15:04:29 **7** MS. O'DELL: Object to form.
15:04:31 **8** THE WITNESS: -- and that's -- yeah, I
15:04:31 **9** have to abide by that.
15:04:32 **10** **Q.** (By Mr. Silver) But my question is you
15:04:35 **11** got that understanding because you had a conversation
15:04:37 **12** with Dr. Longo about it?
15:04:38 **13** **A.** That's his policy. Yes.
14 **Q.** Okay.
15:04:40 **15** **A.** Yes.
15:04:41 **16** **Q.** So I'm going to ask you something a little
15:04:44 **17** more discrete and let's see if we get -- if you give
15:04:48 **18** the same answer, you give the same answer.
15:04:49 **19** **A.** All right.
15:04:50 **20** **Q.** This work, whether you're doing it or not,
15:04:53 **21** that's intended to be published in peer-reviewed
15:04:57 **22** literature, does it have anything to do with any of
15:04:59 **23** the opinions contained in any of the MDL reports that
15:05:02 **24** have been produced in this case?
15:05:03 **25** MS. O'DELL: Object to the form.
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15:05:04 **1** THE WITNESS: I can't answer that. I
15:05:08 **2** don't have an answer for that.
15:05:09 **3** **Q.** (By Mr. Silver) Okay. Same question,
15:05:11 **4** does this work intending to be published in
15:05:15 **5** peer-reviewed literature, if it's being done, have
15:05:16 **6** anything to do with any of the samples that were
15:05:22 **7** provided by Imerys in this litigation?
15:05:25 **8** MS. O'DELL: Objection. Form.
15:05:26 **9** THE WITNESS: Again, I can't -- I can't
15:05:28 **10** answer that. You'll have to talk to Dr. Longo.
15:05:31 **11** **Q.** (By Mr. Silver) All right. This work
15:05:32 **12** that you're intending to be published in
15:05:35 **13** peer-reviewed literature, whether or not it's being
15:05:37 **14** done, is it being funded in any way directly or
15:05:40 **15** indirectly by any of the plaintiffs' counsel?
15:05:43 **16** **A.** I don't know.
15:05:43 **17** **Q.** This work, whether it's being done or not,
15:05:47 **18** with respect to being intended to be published in
15:05:50 **19** peer-reviewed literature, are you working with any
15:05:54 **20** other scientists or experts that are also working
15:06:04 **21** on -- in this talc litigation?
15:06:05 **22** MS. O'DELL: Object to the form.
15:06:06 **23** THE WITNESS: I don't know what their --
15:06:09 **24** how they're working, in what capacity that way.
15:06:12 **25** I don't know.
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15:06:13 **1** **Q.** (By Mr. Silver) Okay. This work, whether
15:06:15 **2** it's being done or not, is it being worked in
15:06:17 **3** conjunction with scientists outside of MAS?
15:06:22 **4** **A.** Yes. If it is, in fact.
15:06:25 **5** **Q.** If it is, in fact, being done.
15:06:27 **6** I apologize, I don't have realtime here.
15:06:37 **7** With respect to the work, if it is being
15:06:41 **8** done on Imerys samples, do you have an
15:06:47 **9** understanding -- strike that. I'll just state it.
15:06:50 **10** To the extent there is work being done,
15:06:53 **11** Imerys is hereby giving MAS notice verbally and will
15:06:56 **12** follow it up in writing that it does not have Imerys'
15:06:59 **13** consent to use any of the samples that was produced
15:07:01 **14** in this litigation. If work's being done and you're
15:07:03 **15** using it, MAS is on notice. Imerys will send
15:07:07 **16** followup in writing.
15:07:13 **17** One more.
15:07:16 **18** Any of the work that's being done, if it's
15:07:19 **19** being done with an intent to publish in a peer
15:07:21 **20** review, does it have anything to do with any of the
15:07:23 **21** underlying data used in any of the MDL reports?
15:07:25 **22** **A.** I don't know. I have no idea. I can't
15:07:29 **23** make a comment on it.
15:07:34 **24** MR. SILVER: No further questions.
15:07:35 **25** THE WITNESS: Thank you.
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15:07:41 **1** MR. FROST: I don't have a mic.
15:07:48 **2** MR. CHACHKES: Switch with me.
15:07:48 **3** MS. O'DELL: So we've got second J&J
15:07:50 **4** counsel?
15:07:51 **5** MR. FROST: J&J is just joining in the
15:07:52 **6** instruction that if there are any Johnson &
15:07:55 **7** Johnson samples being used in the work that may
15:07:56 **8** or may not be being done, you know, at this
15:07:59 **9** point we do not consent to releasing any of the
15:08:01 **10** confidentially on the samples that exist under
15:08:03 **11** the MDL order.
15:08:08 **12** MS. O'DELL: Any further questions
15:08:10 **13** for Imerys?
15:08:13 **14** Okay.
15:08:13 **15** EXAMINATION
15:08:16 **16** BY MS. O'DELL:
15:08:16 **17** **Q.** Okay. Dr. Longo [sic], I've got just a
15:08:28 **18** few questions for you.
15:08:30 **19** Would you please describe for us your
15:08:34 **20** educational background? Let's start there.
15:08:36 **21** **A.** I have a Bachelor of Science degree in
15:08:43 **22** biology from Villanova University. And as I stated
15:08:46 **23** before, this was a premedical curriculum, so it was
15:08:50 **24** heavy on chemistry, organic chemistry. Also I think
15:08:56 **25** I had comparative anatomy, all the typical
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15:09:01 **1** undergraduate courses you have. But the ones that I
15:09:03 **2** selected beyond that were related to the medical
15:09:06 **3** field.
15:09:08 **4** And then I have a Ph.D. from the
15:09:13 **5** University of Georgia in microbiology and a heavy
15:09:18 **6** emphasis in that on pathogenic organisms, also using
15:09:24 **7** electron microscopy techniques in the analysis of
15:09:28 **8** different types of samples.
15:09:30 **9** Also have postgraduate training at the
15:09:33 **10** University of Georgia, also -- we did a lot of
15:09:37 **11** research projects for my major professor at that
15:09:42 **12** time.
15:09:42 **13** Then I also taught a semester course at
15:09:49 **14** Emory University in human anatomy.
15:09:52 **15** So you want me to go on some more?
15:09:55 **16** **Q.** You can stop when you're finished, when
15:09:58 **17** you feel like you've described that. And if you --
15:10:01 **18** well, let me break right here and just ask this
15:10:02 **19** question.
15:10:03 **20** Would you describe briefly your experience
15:10:09 **21** in testing for the presence of asbestos?
15:10:12 **22** **A.** Okay. I've been with MAS since the early
15:10:20 **23** '90s. I think I came to work there in 1989. And
15:10:25 **24** we -- one of the first projects that I worked on
15:10:27 **25** while I was there was the analysis of these Kent
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15:10:32 1 filter cigarettes that had crocidolite asbestos in
 15:10:36 2 the filters, and that asbestos was in those filters
 15:10:39 3 up to 10 percent by weight. 10 percent. They were
 15:10:43 4 essentially solid crocidolite asbestos.
 15:10:47 5 One of the things that the manufacturers
 15:10:51 6 had touted was that they were -- how can I put it --
 15:10:56 7 the best cigarettes for human health, essentially.
 15:10:59 8 And if you talk to people that had smoked those, one
 15:11:04 9 of the complaints they had was the filter worked so
 15:11:06 10 well that all you got was hot air out of them, and we
 15:11:09 11 can see why.
 15:11:10 12 But nonetheless, we published a paper
 15:11:13 13 based on our findings in manipulating the way that a
 15:11:19 14 smoker would with those cigarettes to see if there
 15:11:22 15 were asbestos shed from those filters.
 15:11:26 16 Well, it turns out that we weren't the
 15:11:28 17 first ones that found that information out, that at
 15:11:31 18 the time there was a laboratory -- trying to remember
 15:11:36 19 the name -- Ernest Fullam laboratory who actually did
 15:11:40 20 work for the manufacturer, and they actually had
 15:11:42 21 looked at that smokescreen for asbestos and found
 15:11:47 22 that they had plenty of it coming out of there at the
 15:11:50 23 time. So what we did was a study where we quantified
 15:11:53 24 that amount.
 15:11:54 25 And then that was published rapidly in the

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15:11:57 1 Journal of Cancer so that it could get out and people
 15:12:01 2 could know that if they had smoked these cigarettes
 15:12:03 3 before, it was time to talk to a doctor.
 15:12:05 4 So that was one of the first studies that
 15:12:08 5 I worked on on the asbestos side.
 15:12:11 6 The other, we developed a filter cassette
 15:12:15 7 at the laboratory that we were in the process of
 15:12:18 8 manufacturing, and so we were in that business for a
 15:12:23 9 while so I helped with that technology.
 15:12:25 10 But we also did things like testing
 15:12:28 11 batteries. I know that you've heard the Sears
 15:12:31 12 DieHard batteries. So we did tests on those
 15:12:34 13 batteries because they were coming back -- people
 15:12:37 14 were buying them and then the battery would die
 15:12:39 15 within a very short period of time, and the
 15:12:43 16 contention was that these batteries were defective.
 15:12:46 17 Well, what was happening was they were
 15:12:47 18 buying batteries from people, charging them up, and
 15:12:50 19 putting them back on the shelf. So we essentially
 15:12:53 20 proved that that was happening. And that was a large
 15:12:55 21 study that we did in the early '90s also. So it was
 15:12:58 22 a big materials analysis study.
 15:13:01 23 But over the years I've participated in
 15:13:03 24 hundreds of studies that have analyzed all kinds of
 15:13:06 25 particulates using the technologies that we have at

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15:13:08 1 our laboratories. So not just asbestos, but, you
 15:13:12 2 know, other types of particulates.
 15:13:13 3 Q. Are the testing methodologies that are
 15:13:18 4 employed at MAS methodologies that are generally
 15:13:23 5 accepted?
 15:13:23 6 A. Yes.
 15:13:25 7 MR. CHACHKES: Objection. Leading.
 15:13:26 8 THE WITNESS: These are -- in cases where
 15:13:31 9 we're doing analysis, we're using standard
 15:13:33 10 methodologies. Whether it be mass
 15:13:36 11 chromatography, ion chromatography, all these
 15:13:43 12 are standard methods that we work, and we create
 15:13:45 13 SOPs from the standard methods. So they are
 15:13:45 14 incorporated into the actual methods that we
 15:13:51 15 use.
 15:13:51 16 And again, here in the asbestos analysis
 15:13:54 17 area, we have multiple standard methodologies
 15:13:57 18 that we use.
 15:13:57 19 Q. (By Ms. O'Dell) Have you employed those
 15:13:59 20 standard methodologies in your work in preparing the
 15:14:03 21 report for the MDL?
 15:14:05 22 MR. CHACHKES: Objection. Leading.
 15:14:06 23 THE WITNESS: Yes. Yes, we have. And
 15:14:08 24 they are all listed in the report.
 15:14:10 25 Q. (By Ms. O'Dell) You've talked today about

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15:14:12 1 a quality control program that you have at MAS.
 15:14:16 2 Please describe that, you know, generally.
 15:14:19 3 A. Okay. The quality program for us to be
 15:14:25 4 certified by NVLAP NIST, National Institute of
 15:14:30 5 Standards and Technology, is essentially along the
 15:14:33 6 lines of what's called ISO 17025, which is
 15:14:37 7 methodologies for laboratories.
 15:14:41 8 And they have an entire suite of quality
 15:14:46 9 controls that you use for all of your
 15:14:49 10 instrumentation, for your calibration methods, and
 15:14:53 11 for the analysts, because in these cases, the
 15:14:56 12 analysts are essentially the machines. They're not
 15:15:00 13 like gas chromatographs; they are people, and the
 15:15:03 14 people have to be certified for the methods.
 15:15:05 15 So they are put through the rigors of
 15:15:08 16 actually extensive training in the beginning when
 15:15:12 17 they come to our laboratory, and then they have to
 15:15:15 18 take periodic tests, if you will, from the American
 15:15:19 19 Industrial Hygiene Institute, AIHA, and also NIST
 15:15:25 20 NVLAP. They'll send us blind samples, and then what
 15:15:29 21 we have to do is analyze them and identify them.
 15:15:32 22 So -- and we do the same thing for other
 15:15:34 23 programs. Like we do mold analysis, and we're part
 15:15:37 24 of the AIHA, American Industrial Hygiene
 15:15:41 25 Association's, certification for our laboratory.

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15:15:43 1 We also have what's called A2LA. That's
15:15:47 2 another certifying body. They're all based upon the
15:15:52 3 ISO 17025 for laboratories. So it's very extensive
15:15:56 4 quality control.
15:15:56 5 Q. For approximately how many years has MAS
15:16:00 6 had a quality control program like you described?
15:16:03 7 A. Since as long as I've been there.
15:16:06 8 Q. So more than 30 years?
15:16:07 9 A. Oh, yeah. Yeah.
15:16:08 10 Q. What's your responsibility in the quality
15:16:10 11 control process?
15:16:12 12 A. Well, we have a quality control officer,
15:16:17 13 and my responsibility is to see that quality of
15:16:26 14 program's followed for the work that we do.
15:16:29 15 Now, I mean, the program's followed
15:16:33 16 according to the certifying body, so we have to
15:16:37 17 follow their protocols and standards. And so we just
15:16:43 18 have to be sure that we've documented all of our
15:16:46 19 activities for quality in all these areas.
15:16:49 20 Q. Are the quality control standard
15:16:55 21 procedures that you've described applied both in --
15:16:59 22 are they applied in nonlitigation matters, I'm
15:17:02 23 assuming?
15:17:02 24 A. Yes.
15:17:02 25 Q. Are they applied in litigation matters?

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15:17:04 1 A. Yes. They're applied in all matters of
15:17:06 2 analysis. So we -- I mean, machine calibration,
15:17:15 3 analyst training calibration, if you will, that way,
15:17:19 4 all of that has to be followed.
15:17:21 5 Q. Is the methodology that you've used in
15:17:51 6 rendering your opinions in this case the same
15:17:53 7 methodology that you use in nonlitigation matters?
15:17:55 8 A. Yes. Same standard types of methods.
15:17:59 9 Yes.
15:17:59 10 Q. Is there anything -- strike that. Let me
15:18:03 11 ask this.
15:18:03 12 What was your responsibility in relation
15:18:07 13 to the MDL report?
15:18:10 14 A. As I stated earlier, it was report review,
15:18:14 15 documentation review. As far as data review, I had a
15:18:20 16 big portion of the data review. And then the quality
15:18:23 17 review.
15:18:25 18 Q. Okay. You've been asked a number of
15:18:33 19 questions about the policy at MAS regarding ongoing
15:18:46 20 research or ongoing discussions about research --
15:18:50 21 A. Yes.
15:18:50 22 Q. -- and -- do you have an understanding as
15:18:56 23 to why it is the policy at MAS not to discuss studies
15:19:00 24 that have not been completed or still being
15:19:03 25 formulated?

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15:19:06 1 MR. SILVER: Objection to form.
15:19:08 2 THE WITNESS: Well, of course, there's
15:19:09 3 client confidentiality, which we hold to the
15:19:13 4 highest in terms of any discussions of any work
15:19:15 5 that we're doing for anyone else. As you've
15:19:19 6 seen today, I haven't talked about any clients
15:19:22 7 that we work with, and can't do that.
15:19:24 8 As far as publications, that type of
15:19:27 9 thing, we don't -- again, that's just a policy.
15:19:31 10 We had a bad experience a number of years ago,
15:19:35 11 and since that time we've adopted that policy,
15:19:38 12 and it's part of the confidential documentation
15:19:42 13 that we keep.
15:19:49 14 MS. O'DELL: Nothing further. Thank you.
15:19:53 15 MR. CHACHKES: Nothing more here.
15:20:02 16 MR. FROST: I just want to make it clear,
15:20:06 17 until we can resolve this issue regarding the
15:20:08 18 publication or the potential publication of
15:20:09 19 these issues, we would like to and deem that
15:20:12 20 this deposition remains open.
15:20:14 21 MS. O'DELL: We oppose that, as I think
15:20:17 22 the rule is very clear in terms of discovery of
15:20:20 23 confidential proprietary matters, and Dr. Rigler
15:20:23 24 has testified these are proprietary matters, and
15:20:27 25 so we would oppose holding the deposition

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15:20:29 1 open --
2 MR. FROST: Sure. That's fine.
15:20:31 3 MS. O'DELL: -- and certainly discovery.
15:20:34 4 MR. FROST: Thank you.
15:20:36 5 (Deposition concluded at 3:20 p.m.)
6 (Pursuant to Rule 30(e) of the Federal
7 Rules of Civil Procedure and/or O.C.G.A.
8 9-11-30(e), signature of the witness has been
9 reserved.)
10 (Original transcript sent to Jack Frost.)
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1 CERTIFICATE

2
3 STATE OF GEORGIA:

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6 I hereby certify that the foregoing
7 transcript was taken down, as stated in the
8 caption, and the questions and answers thereto
9 were reduced to typewriting under my direction;
10 that the foregoing pages 1 through 228 represent
11 a true, complete, and correct transcript of the
12 evidence given upon said hearing, and I further
13 certify that I am not of kin or counsel to the
14 parties in the case; am not in the regular
15 employ of counsel for any of said parties; nor
16 am I in anywise interested in the result of said
17 case.18 This, the 8th day of February, 2019.
1920
21 FRANCES BUONO, B-79122 Georgia Certified Court Reporter
23
24
25

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1 DEPOSITION OF MARK W. RIGLER, PH.D. /FCB

2 I do hereby certify that I have read all
3 questions propounded to me and all answers given by
me on the 6th day of February, 2019, taken before
Frances Buono, and that:

- 4
-
- 5 1) There are no changes noted.
-
- 6 2) The following changes are noted:

7 Pursuant to Rule 30(e) of the Federal Rules of
Civil Procedure and/or the Official Code of Georgia
Annotated 9-11-30(e), both of which read in part:
Any changes in form or substance which you desire to
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statement of the reasons given...for making them.
Accordingly, to assist you in effecting corrections,
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12 Page No. ____ Line No. ____ should read: ____
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3 Regulations of the Board of Court Reporting of the
Judicial Council of Georgia which states: "Each court
4 reporter shall tender a disclosure form at the time
of the taking of the deposition stating the
5 arrangements made for the reporting services of the
certified court reporter, by the certified court
6 reporter, the court reporter's employer, or the
referral source for the deposition, with any party to
7 the litigation, counsel to the parties or other
entity. Such form shall be attached to the
8 deposition transcript," I make the following
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Atlanta Reporters was contacted to provide court
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1 DEPOSITION OF MARK W. RIGLER, PH.D. /FCB

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12 Page No. ____ Line No. ____ should read: ____
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14
15 If supplemental or additional pages are necessary,
16 please furnish same in typewriting annexed to this
deposition.
17
18 MARK W. RIGLER, PH.D.
19 Sworn to and subscribed before me,
This the ____ day of ____, 20__.20
21 Notary Public
My commission expires: ____
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Exhibit G

*Continue
File
Johnson & Johnson
TMC
-ANALYTICAL*

*What is cost of
each sample submitted
to Johnson & Johnson
quicker
New Brunswick, N.J.
January 3, 1974 #36*

Subject: PURCHASE OF A TRANSMISSION ELECTRON
MICROSCOPE PLUS ATTACHMENTS

Dr. ~~E. R. L. Gaughran~~
to
Dr. T. H. Shelley

Over the past three years, there seems to have been general agreement that Transmission Electron Microscopy is the only absolute proof with electron diffraction for the identification of asbestos in talc. We have elected to use outside laboratories since any results generated in-house were suspect. In view of the latest findings at Windsor Minerals, it appears wise that we maintain a closer surveillance on both the ore and finished product on an in-house basis.

The approximate cost of a T.E.M. plus accessories is \$175,000. I think it is something we perhaps should consider in the near future. Needless to say, it was not forecasted for 1974.

AL
A. J. Goudie

ab

cc: Mr. G. Lee
Dr. F. R. Rolle

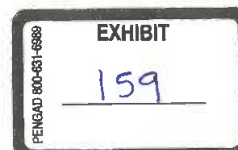


Exhibit H

**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF NEW JERSEY**

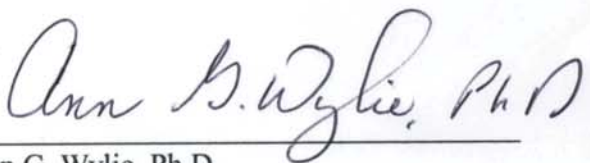
**IN RE: JOHNSON & JOHNSON TALCUM
POWDER PRODUCTS MARKETING, SALES
PRACTICES AND PRODUCTS LIABILITY
LITIGATION**

MDL NO. 16-2738 (FLW) (LHG)

THIS DOCUMENT RELATES TO ALL CASES

**EXPERT REPORT OF ANN G. WYLIE, PHD
FOR GENERAL CAUSATION *DAUBERT* HEARING**

Date: February 25, 2019



Ann G. Wylie, Ph.D.

I. SUMMARY OF OPINIONS

I have been asked to provide my opinion in the form of an overview of the nature of talc, amphibole, and serpentine minerals associated in and around talc deposits. I will discuss the differences between amphibole particles that form as asbestos (asbestos fiber) and those that form from crushing rock (cleavage fragments) and the distinctions between these two forms of amphibole. I will describe the conditions necessary for mineral fiber to form, provide an overview of the ways in which talc forms and describe the evidence on the association of different talc ores with asbestos. I will also provide my perspectives on how regulatory analytical techniques have been used to incorrectly classify cleavage fragments as asbestos fibers.

The opinions expressed in this report are rendered with a reasonable degree of scientific certainty. Based on my education, training and experience as a geologist and my review of relevant information for this matter, I have reached the following conclusions and opinions:

- A. Talc is a mineral and a component of cosmetic and industrial talc products. It is formed by alteration of Mg-rich rocks. Talc for cosmetic use is mined in only a few places because of the stringent requirements for the product.
- B. Amphibole and serpentine are both common rock-forming minerals. Both are hydrated, both can be found in Mg-rich rocks, and both can be associated with talc ore. Both occur rarely as asbestos.
- C. Amphiboles, talc (and other minerals) may form elongated fragments when they are broken during mining, mineral processing and rock and soil excavation. These fragments are not “asbestos,” nor “asbestiform” and they do not have the properties of asbestos.
- D. Mineral fiber is uncommon. Amphiboles that form in the asbestiform habit (e.g., asbestos) exhibit special properties that are different than those same amphiboles that otherwise form in nature.
- E. Many naturally occurring minerals will form elongated particles that meet regulatory criteria for fiber. Unfortunately, analytical protocols developed for occupational monitoring for airborne fiber during asbestos use and for determination of clean air after removal of asbestos from school buildings will produce false positives for mineral fiber when applied to rock powders. Regulatory criteria are broad and obscure the fundamental characteristics of asbestos.
- F. Amphibole populations of asbestos fibers and cleavage fragments each have distinctive characteristics in their optical properties, dimensions and habits. The two types of microscopy used in making this distinction, polarized light microscopy (PLM) for optical properties and electron microscopy for dimensions and habit. The reports provided by plaintiffs’ experts Drs. Longo and Rigler examining the body powder products at issue in this litigation do not present evidence consistent with the optical properties or habit of asbestos.

- G. PLM can be used effectively to detect and identify asbestos in talc products because there are optical properties that are characteristic of cleavage fragments and others that are characteristic of asbestos.
- H. The photomicrographs found in Drs. Longo and Rigler's reports document the presence of cleavage fragments. Particles labeled as bundles do not have morphology consistent with that designation (i.e., they are not bundles).
- I. Evidence of fiber bundles is lacking in Drs. Longo and Rigler's transmission electron microscopy (TEM) photomicrographs of tremolite and anthophyllite, despite the fact that the particles are labeled as bundles. There is a wide range in the width of particles identified as tremolite and anthophyllite, and the particle shapes are consistent with a population dominated by cleavage fragments.
- J. In general, to determine if a particle is asbestiform, one cannot simply calculate its aspect ratio. Aspect ratio does not tell anything about actual size, only relative size. Aspect ratio has no dimension. Characteristic of both asbestos and cleavage fragments is an increase in aspect ratio with increasing length, i.e., longer elongated mineral particles (EMPs) have higher aspect ratios. Differences or similarities in aspect ratio frequencies may, therefore, be due to differences in length frequencies rather than habit.
- K. TEM techniques do not readily distinguish between EMPs of talc and anthophyllite. PLM is the most reliable instrument to make this distinction.
- L. Based on their geologic settings, reports from mine geologists and literature descriptions of the ore deposits providing cosmetic talc for the relevant body powder, it is unlikely that asbestos could be found in the talc products from these mines.
- M. The formation of talc does not require nor favor the formation of asbestos in the ore.
- N. In rushing to deal with the asbestos problem of the 1960s, the Occupational Safety and Health Administration (OSHA) oversimplified its regulations, and in so doing, confused the distinctions between asbestos and cleavage fragments. Today, all regulatory language specifies the asbestiform habit, and by policy and practice regulatory bodies do not regulate cleavage fragment EMPs as asbestos.

II. BACKGROUND AND QUALIFICATIONS

I graduated *cum laude* from Wellesley College with a degree in Geology in 1966. I received my Ph.D. from Columbia University in 1972 with a major in economic geology, and minors in mineralogy, petrology and mining engineering. I was appointed Assistant Professor by the Department of Agronomy at the University of Maryland in 1972, but one year later the appointment was transferred to the newly formed Department of Geology. I retired as Professor of Geology and Distinguished Scholar Teacher in 2014, but continue to hold an appointment as Professor Emerita. In addition to my academic appointments, between 2000 and 2014, I held a variety of senior level administrative appointments, including Assistant President and Chief of Staff, Vice President for Administrative Affairs, and Senior Vice President and Provost.

Between 1979 and 2017, I published, among others, 38 articles on talc, amphibole and/or asbestos in highly regarded peer-reviewed publications. My curriculum vitae is attached as Exhibit A.

My most recent papers include:

Wylie, A and P Candela (2015). Methodologies for determining the sources, characteristics, distribution, and abundance of asbestiform and non-asbestiform amphibole and serpentine in ambient air and water. *Journal of Toxicology and Environmental Health, Part B: Critical Reviews*. 18: 1-42.

Wylie, A.G. (2016). Amphiboles: Fibers, fragments and mesothelioma. *Canadian Mineralogist* 54(6): 1403-1435.

Kerrigan, RJ, Candela PA, Piccoli PM, Frank M and Wylie A (2017). Olivine + quartz + water \pm HCl at mid-crustal conditions: controls on the growth of fibrous talc as determined from hydrothermal diamond anvil cell experiments. *Canadian Mineralogist*. 55(1): 101-113

Wylie, A.G. (2017). Mineralogy of Asbestos and fibrous erionite. In *Current Cancer Research: Asbestos and Mesothelioma*, Joseph Testa Ed. Springer, Heidelberg pp, 11-41.

I am being compensated at a rate of \$350 per hour for my expert work in this litigation.

III. OPINIONS

A. What is talc?

Summary: Talc is a mineral and a component of cosmetic and industrial talc products. It is formed by alteration of Mg-rich rocks. Talc for cosmetic use is mined in only a few places because of the stringent requirements for the product.

A **mineral name** specifies 1) the chemical composition, and 2) the atomic structure; together these must be unique to be called by a mineral name.

Talc is hydrated magnesium silicate (meaning it contains water, magnesium and silicon) with a chemical formula of $\text{Mg}_3\text{Si}_4\text{O}_{10}(\text{OH})_2$. It belongs to a group of minerals known as sheet silicates, due to the sheet-like arrangement of the atoms in the structure.

Talc is the softest mineral known, and it can be broken easily with your fingernail into flat plate-like particles; the particles are referred to as “platy.” These smooth, flat particles give the material a greasy or slippery feel and make it suitable for body powder. Talc may also form irregularly shaped or even elongated prismatic particles, but these are less desirable for cosmetic talc. Mineral talc can also form as fibers. In New York State, for example, the fibers are asbestiform and probably formed from the alteration of anthophyllite. Talc fiber may also form directly from metamorphic fluids without alteration from an amphibole (Kerrigan et al 2017). This type of talc fiber is a normal, but not abundant, component of most talc ore.

Confusingly, the term “talc” is also used to refer to mineral products containing the mineral talc in proportions that vary from about 30 to 100 percent. I will use “talc” to mean the mineral, and specify **industrial or cosmetic talc** when referring to a mineral product that contains it. **Talc ore** means the rock from which the talc was extracted.

Talc ore is formed by **hydrothermal alteration of other minerals during metamorphism**. This means that at some time in the geologic past, elevated temperature and fluid pressure prevailed in rock, resulting in chemical reactions with one set of minerals changing into (metamorphosing) another set. Hydrothermal means hot water and metamorphism means mineral transformations. Talc results if the starting rock is of the right composition, water is present and the right temperature and pressure are in place.

Talc ore is mined for both industrial and cosmetic use, but from different ore bodies and in different mines. Industrial talc used in paint, plastic, rubber and ceramic tile, for example, is unsuitable for cosmetic purposes due to its physical properties and mineral composition. Industrial talc products vary widely in color, texture and talc content. In Texas, for example, the talc ore that is mined for ceramics is black. Some industrial talc contains < 50% mineral talc.

Talc ore used for cosmetic purposes, however, is different. For talc to be sold as body powder, it must meet specifications in color, texture, mineral composition and absorbance, which ore from only a few mines can provide. For example, cosmetic talc product normally contains $\geq 95\%$ mineral talc, is very white and must be substantially free of quartz. Talc ores from which a product of this purity can be extracted economically are uncommon.

B. What are amphibole and serpentine minerals?

Summary. Amphibole and serpentine are both common rock-forming minerals. Both are hydrated, both can be found in Mg-rich rocks, and both can be associated with talc ore. They occur rarely as asbestos.

1. Amphibole.

Amphibole minerals are a family of double-chain hydrated silicate minerals. Amphiboles are referred to as rock-forming minerals because of their abundance. Overall, amphibole can be found in six to ten percent of the crustal rock of the contiguous US (Wylie and Candela, 2015), but in some areas it is more abundant. Amphibole is most common in metamorphic rocks and metamorphic rocks are common in old and new mountain belts. Amphiboles are also found in the oldest rocks that form the continental cores, and in and around intrusive igneous rock, such as granite, which crystallizes from liquids (magma). Figure 1 shows the distribution of igneous and metamorphic rocks in the US that may contain amphibole and serpentine.

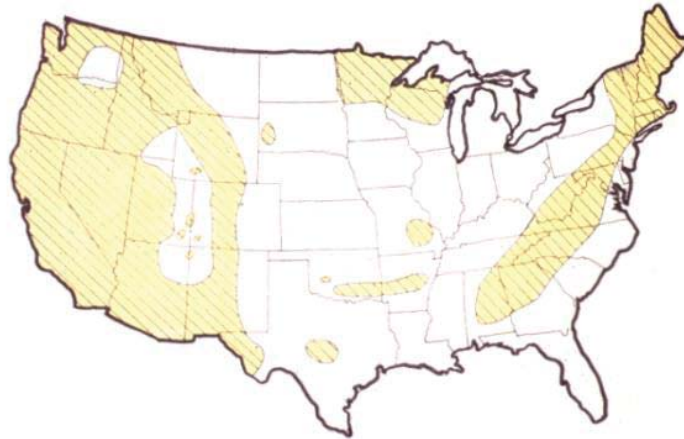


Figure 1. This map was produced by Kuryvial et al (1974), US EPA. It shows the distribution of rocks likely to contain amphibole and serpentine.

Amphiboles are composed of the most common elements found in the crust of the earth. These elements and abundances are: oxygen (46.6%), silicon (27.7%), aluminum (8.2%), iron (5.0%), calcium (3.6%), potassium (2.8%), sodium (2.6%) and magnesium (2.1%). (Rudnick and Gao, 2003).

Amphiboles are so common in some rocks that the names of several main rock categories refer to the amphibole component. These include amphibolite, greenstone (green amphibole), and blue schist (blue amphibole). Amphiboles also occur in smaller quantities in marble and granite (e.g., the dark streaks in granite used for countertop materials and building stone commonly contains amphibole), or in large quantities in some metamorphosed banded iron formations, the major ore of iron worldwide. Amphiboles may also occur in soils formed from underlying amphibole containing rock and in deposits left by glaciers. Amphibole-rich rock is mined for building roads and rail lines and has been used in a crushed form on “clay” tennis courts. Mines of many different commodities penetrate rock containing amphibole, including iron, gold, talc, copper and crushed stone. Amphibole may be a common component of dimension stone for floor tiles and it forms nephrite, the name for common jade.

The amphibole minerals most commonly associated with talc are tremolite, actinolite and anthophyllite. The ideal formulas are $\text{Ca}_2(\text{Mg,Fe})_5\text{Si}_8\text{O}_{22}(\text{OH})_2$ for the tremolite-actinolite continuum (nomenclature based on $\text{Mg}/(\text{Mg}+\text{Fe})$), and anthophyllite, $\text{Mg}_2(\text{Mg,Fe})_5\text{Si}_8\text{O}_{22}(\text{OH})_2$. Nomenclature of these amphiboles is formally determined by precise chemical analysis and standards established by the International Mineralogical Association.

2. Serpentine.

Like talc, serpentine is formed by alteration of ultramafic rock and carbonates, and like talc, it is a hydrated magnesium sheet silicate. Serpentine contains 13% water, while talc contains about 5%. (Veblen and Wylie, 1993).

There are three serpentine minerals that have the same ideal chemical formula ($\text{Mg}_3\text{Si}_2\text{O}_5(\text{OH})_4$) and all have a sheet-like atomic structure. However, they crystallize in three distinct atomic arrangements. The three forms are called **chrysotile**, **antigorite** and **lizardite**. Chrysotile forms from rolled sheets forming tubes that are about 0.025 μm in diameter and have an inner hollow tube of about 0.005 μm (Veblen and Wylie 1993); these are **fibrils** of chrysotile asbestos.

Serpentine is the major mineral in the rock **serpentinite**. Serpentinites are common throughout the Appalachian Mountains and in California in large blocks, varying in size from feet to miles. In these occurrences, serpentinite was thought to have originated as a piece of ocean crust thrust onto the continent during mountain building processes associated with plate tectonics.

Serpentine may also form as a mineral component of some metamorphosed carbonate rocks.

C. What is a mineral fiber and what is “asbestos”?

Summary: Mineral fiber is uncommon. Amphiboles that form in the asbestiform habit (e.g., asbestos) exhibit special properties that are different than those same amphiboles that otherwise form in nature.

In most dictionaries, the definition of fiber is ‘threadlike’. When minerals form in nature as bundles of easily separable, long, very thin, very narrow crystals that are flexible (high tensile strength), the description “threadlike” may apply. Such material is called asbestos. Under U.S. regulatory policy, the term “asbestos” has been applied only to six asbestiform minerals mined and sold as “asbestos,” namely chrysotile and the asbestiform varieties of actinolite, grunerite (amosite), anthophyllite, riebeckite (crocidolite) and tremolite.

Asbestos is not a mineral, but a **set** of durable, chemical and heat resistant minerals that form in the **asbestiform habit**. Habit is a mineralogical term specifying the physical form a mineral takes when it forms (grows) in nature, e.g., globular, granular, prismatic, fibrous. The habit of growth of asbestos is referred to as **asbestiform**. **This means that the occurrence of the mineral is as narrow, fairly uniform single crystals called fibrils occurring in bundles (common) and matted masses (rare).** Asbestos is easily separated into fibrils and fiber bundles with hand pressure.

The term “fibrous” is much broader than asbestiform, which it includes. Fibrous also applies to wide, brittle, glassy fibers called byssolite, and even materials that look like they may be made up of fiber are referred to with this term.

The habit of asbestos is well illustrated in Figure 2 below. The very narrow fibers and fibrils are not connected laterally to each other so they can scatter and separate easily. Note the similarity in the width of the fibrils. Amphibole asbestos almost always occurs in amphibole bearing rock and chrysotile asbestos almost always occurs in serpentinite. However, only about 0.1% of amphibole minerals are formed in the asbestiform habit and occurrences are localized and uncommon (Wylie and Candela, 2015).

Mineral fiber forms in nature only under very special circumstances. An environment containing water-rich fluid, saturated with the mineral in solution, and a space in which to grow fiber unimpeded is necessary for the rapid precipitation of very fine fibrils of asbestos. Such environments are limited in scope and time.

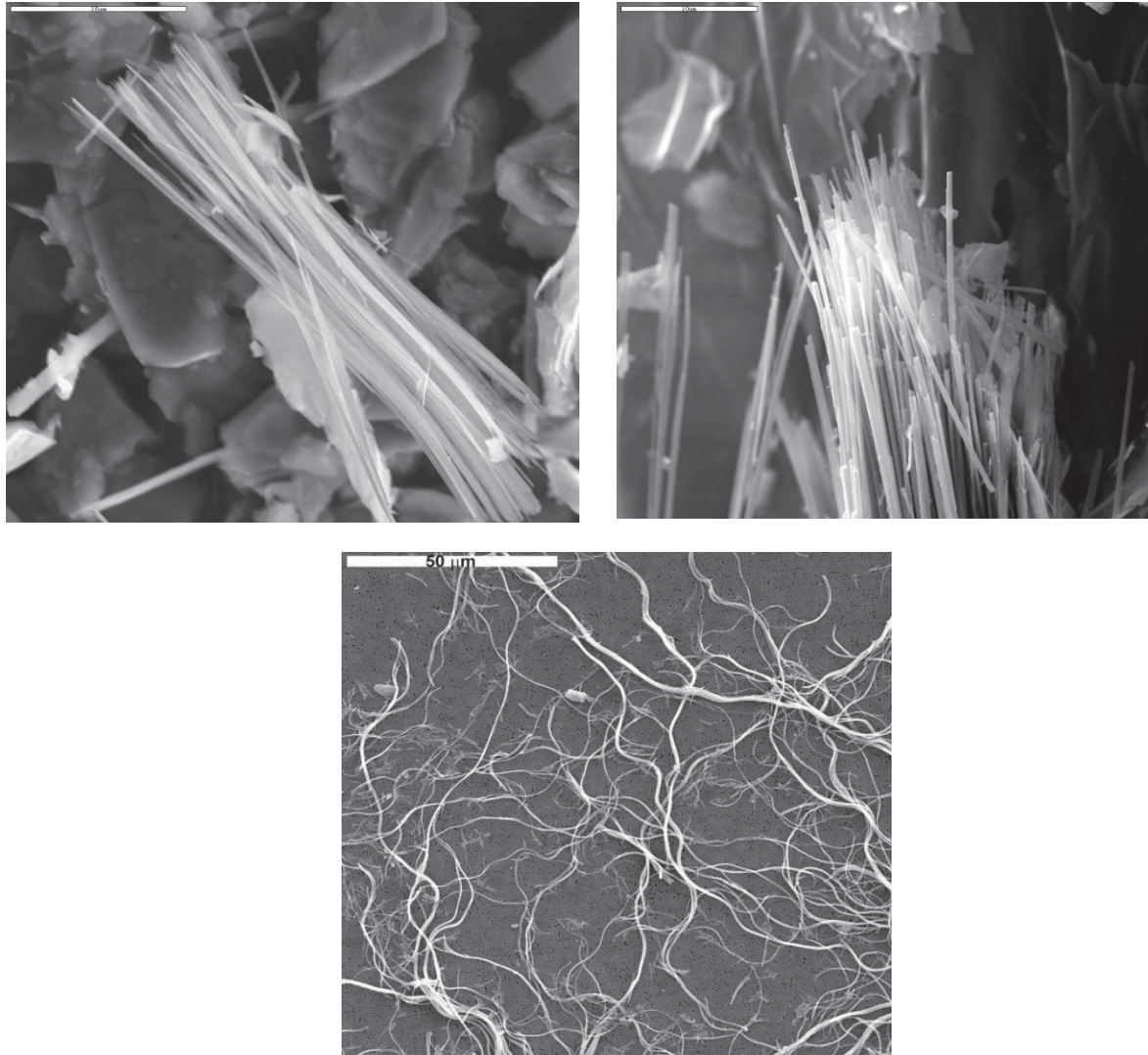


Figure 2. Asbestos from USGS (Usgsprobfe.cr.usgs.gov/picts2.html): a) tremolite asbestos, Death Valley California; b) Richterite-winchite asbestos, Libby MT; and c) UICC chrysotile A

In regions where heat flow is high and volcanism is active, there will likely be asbestiform mineral fiber. For example, mineral fiber is common in areas with Cenozoic (last 65 million years) volcanism, such as Turkey, Oregon and Nevada, where asbestiform fibers of the mineral erionite formed in altered volcanic glasses and tuffs, or southern Italy, where fibers of the amphibole fluoro-edenite formed in seams and cavities in volcanic rocks around Mt. Etna. (Gianfagna et al., 2007). This is not a normal environment for talc deposits.

Asbestiform fiber can form when fluid pressures are very high because of tectonics (mountain building), as evidenced by the fibrous masses of amphibole glaucophane winding around blocks of other rock in the blue schist of California that formed during subduction of the Pacific Plate under North America, or, the mountain of very short mass fiber chrysotile that occurs at the Coalinga deposit of California. The **mass fiber** anthophyllite-asbestos ores at Paakkila, Finland, and elsewhere were probably formed by high fluid pressure events during retrograde metamorphism.

Asbestiform mineral fiber can form when rocks are under tension and hot water carrying dissolved components of amphibole or serpentine is available. This is the most common environment for the formation of asbestos fiber. This may be expansion upward as over burden is removed or the crust thins, in faults that pull rock apart, and in the axes of folds. Fiber that forms under these circumstances occurs in well-defined planes called seams or veins containing fibers that grow perpendicular to the wall of the seam, parallel to the direction of expansion. This fiber is called **cross fiber**. In the event that the movement involved lateral motion, mineral fiber may form parallel to the wall of the seam, and this is referred to as **slip fiber**. Amosite and crocidolite ores are from veins, primarily cross fiber. Most chrysotile deposits are also cross fiber (with the notable exception of the Coalinga mountain in California). Tremolite asbestos and actinolite asbestos also form in cross fiber and slip fiber veins.

Figure 3 below includes pictures of “asbestiform” ice. Ice is a mineral. I took the first picture while hiking in the Catoctin Mountains. It had been quite cold for many days and there had been some snow. The day before this was taken, the day was warm, and the upper several inches of soil had thawed, leaving a very muddy surface layer in some places. The next night, the temperature dropped quickly and the mud froze with fibers of ice forming rapidly in the mud.

Not everything is understood about how mineral fiber forms, however. For example, it was recently discovered that the form of fibrous ice shown in Figure 3(b) grows on a substrate of wood. The individual fibers remained as separate fibrils due to a chemical released by fungus living in the wood. While fungus may not be implicated in the origin of asbestos, the chemistry of the fluids from which asbestos forms likely influences fiber formation in similar ways. In fibrous ice, individual fibers of ice share a common axis of elongation, but because of their rapid nucleation and growth, or in one case, the presence of fungus, fibers are not connected to each other, so they separate readily. Fibrous ice, like asbestos, only forms in very particular environments. Unlike asbestos, fibrous ice lacks durability, so while it is asbestiform in habit, it is not asbestos.



Figure 3. Fibrous Ice. a) Ice from saturated muds, Catoctin Mountains, MD. b) Fibrous ice formed in forest in Germany (from Eos. V 96. Number 16. 2015, p. 3)

Importantly, asbestos fiber exhibits many properties different from those characteristic of fragments of the same mineral, even if the particles are of roughly the same length. Fibers of

asbestos are narrower than cleavage fragments of the same length. Fibers of asbestos possess high tensile strength and flexibility, both attributable to the narrowness of fibrils. High tensile strength promotes the preservation of long fiber during crushing. Bundles of even a few fibrils will exhibit properties that are anomalous when viewed by polarized light microscopy (Verkouteren and Wylie 2002).

D. What are cleavage fragments?

Summary: Amphiboles, talc (and other minerals) may form elongated cleavage fragments when rocks are broken during mining, mineral processing and rock and soil excavation. These fragments are not “asbestos,” nor “asbestiform,” and they do not have the properties of asbestos.

Amphiboles possess in their atomic structure two planes that have weaker bonds than other directions in the lattice, meaning they will break, or “cleave,” preferentially along these weak planes. For this reason, when amphibole-bearing rock is crushed during mining and mineral processing, amphibole of all compositions will form elongated fragments (EMPs). These are referred to as **cleavage fragments**, cleavage because they were “cleaved” from a larger piece of amphibole, and “fragment” because they were formed by fracture. Amphibole, like almost all rock, is brittle unless asbestiform, and it readily forms EMPs when crushed.

For visual reference, Figure 4 is non-asbestiform amphibole EMPs of the amphibole riebeckite, formed by crushing more massive material. The image in Figure 5 is reproduced from the United States Geological Survey’s website (usgsprobe.cr.usgs.gov/picts2.html). The particles shown are non-asbestiform amphibole, in this case tremolite, which was crushed, forming EMPs. The sizes and shapes of the amphibole cleavage fragments depicted in Figures 4 and 5 are similar to cleavage fragments formed by crushing many common, durable, silicate minerals.



Figure 4. Cleavage fragments of amphibole riebeckite as seen by PLM. Largest particles are about 20 μ m in length.

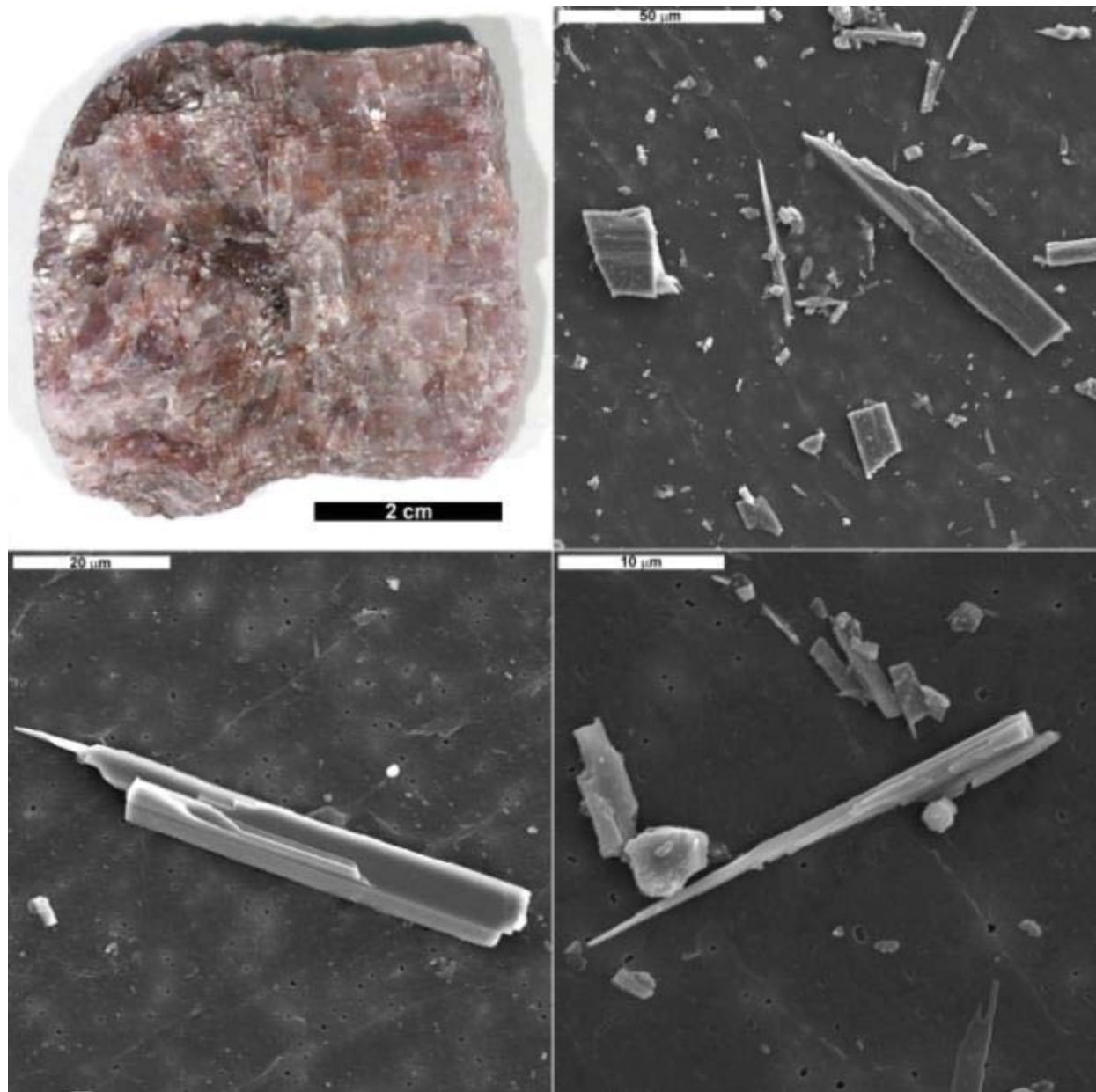


Figure 5. Tremolite cleavage fragments viewed by SEM (USGS).

Cleavage fragments are elongated chunks of rock and are generally wider than asbestos fiber of the same composition and length. Cleavage fragments are brittle. They are never “threadlike.” They do not exhibit enhanced tensile strength. Mineral fiber cannot be produced from cleavage fragments. I am unaware of any literature that supports the notion that non-asbestiform minerals such as tremolite could be modified during processing and turned into asbestos. If a mineral does not form as fibers in nature, it cannot form the very thin fibers characteristic of asbestos by crushing it. Moreover, while asbestos fiber bundles may disaggregate after entering the respiratory system, resulting in increases in the dose of fiber over time, cleavage fragments do not disaggregate after entering the body because they are single structures.

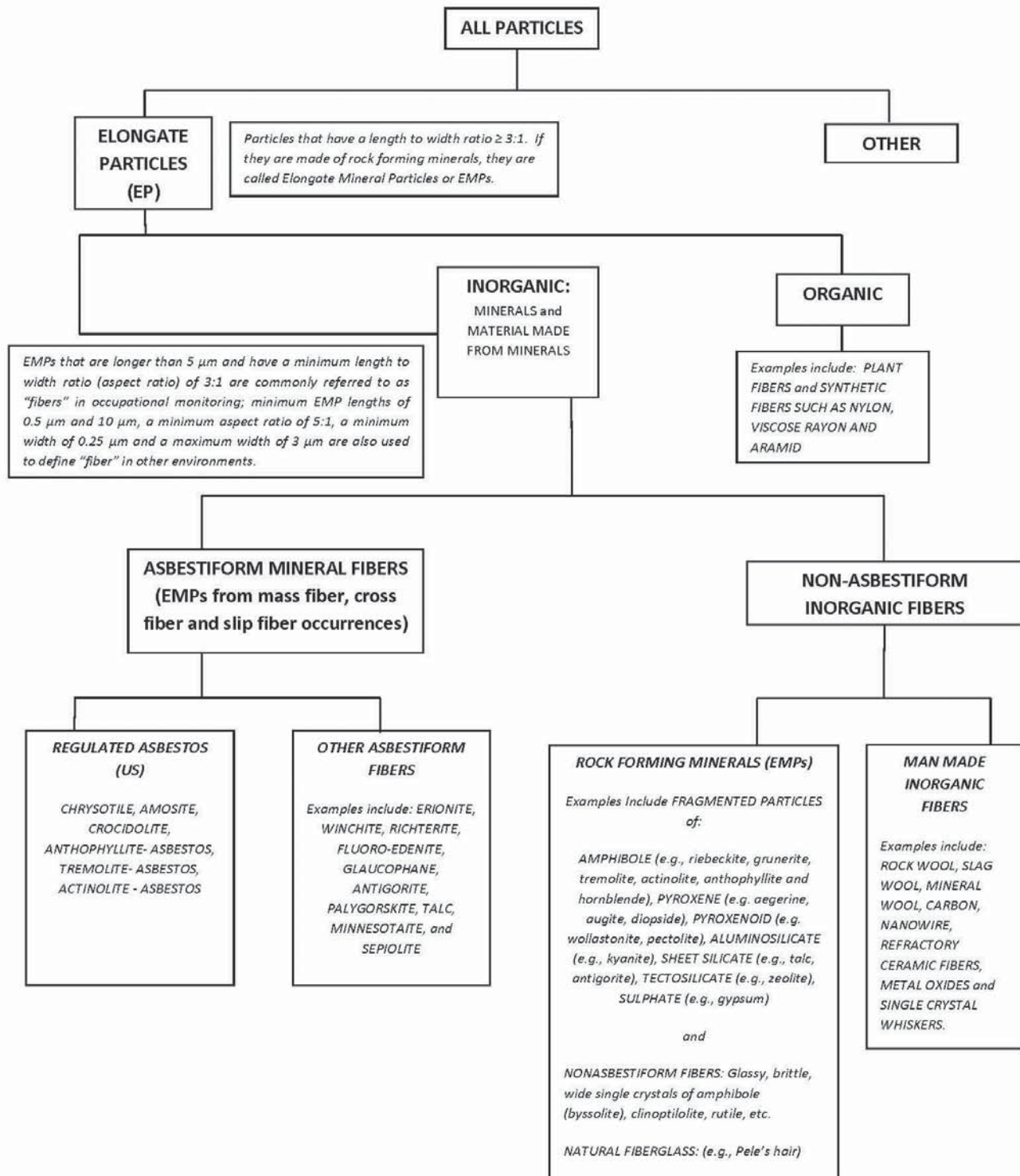
E. Regulatory Terminology: Fibers and elongated mineral particles (EMPs).

Summary: Many naturally occurring minerals will form elongated particles that meet regulatory criteria for fiber. Unfortunately, analytical protocols developed for occupational monitoring and for determination of clean air after removal of asbestos from school buildings, will produce false positives when applied to durable EMPs in rock powders. The regulatory criteria are broad and obscure the fundamental characteristics of asbestos.

Federal protocols for monitoring known occupational exposure to asbestos specify the term **fiber** to mean any airborne particle that is greater than 5 μm in length that has a length to width ratio of at least 3:1. For assessing the cleanliness of a building after asbestos removal, federal AHERA (US EPA 2002) rules require that airborne asbestos fibers longer than 0.5 μm with a length to width ratio of at least five (5:1) be counted. Other federally recognized methods for monitoring asbestos use other fiber definitions in exposure assessments. In short, there are multiple definitions of the term fiber used in regulatory protocols; none describes thread-like asbestos mineral fiber very well (Candela and Wylie, 2015).

NIOSH introduced the term elongate mineral particles (EMPs) in 2006 (NIOSH, 2006). An EMP that was formerly referred to as fiber based on dimensions is now called an elongated mineral particle. EMP is a neutral term because it assumes nothing about the manner in which it formed: growth or fracture. It may be an elongated rock fragment formed during crushing rock (cleavage fragment) or liberated during soil formation, or it may be asbestos. Particles counted by occupational monitoring protocols for asbestos are not necessarily mineral fibers, but they are all EMPs.

The chart on the next page shows the types of material that qualify as EMPs. It illustrates the fact that many common minerals can form EMPs and that many particles could be incorrectly classified as mineral fiber by federal asbestos counting criteria. Because they are common, miners of many different materials have routinely been exposed to EMPs. This Table is published in Toxicology and Applied Pharmacology (Weill et al., 2018).



F. How to distinguish cleavage fragments from asbestiform fiber by microscopy.

Summary: Amphibole populations of asbestos fibers and cleavage fragments each have distinctive characteristics in their optical properties, dimensions and habits. The two types of microscopy used in making this distinction are: polarized light microscopy for optical properties and habit and electron microscopy for dimensions and habit. The reports provided by plaintiffs' experts Drs. Longo and Rigler examining Johnson's Baby Powder and Shower to Shower do not present evidence based on optical properties and habit for a population of asbestos fibers.

The distinction between cleavage fragments and asbestiform fibers is widely understood by science, industry and government. For example, the distinction is made by OSHA, which, by policy, regulates only fibers and not cleavage fragments (Crane, 2018). As discussed in the section entitled "Initial regulation of asbestos," below, other federal agencies also make the distinction in policy. Unfortunately, when OSHA removed cleavage fragments from asbestos regulation in 1993, it did not mandate a method to differentiate them from fiber, essentially leaving it up to others to sort out. OSHA's regulatory approach is consistent with counting EMPs as asbestos **only** when there is evidence of asbestos in the workplace already. In other words, OSHA do not follow its counting protocol as a definition of fiber because it is overly broad and inconsistent with its acknowledgement that non-asbestiform amphibole is not covered by its regulations.

Despite the lack of regulatory guidance, scientists have developed approaches for distinguishing between cleavage fragments and asbestiform fiber by employing all types of **microscopy** to look at populations of particles in mineral powders. While a single particle observed by microscopy might be confidently called a fiber or fiber bundle or fragment because of some defining characteristic(s), other particles cannot so easily be labeled, and must be viewed as part of a population of particles. The criteria for distinguishing mineral fiber from mineral fragments are different and complementary depending on what type of microscopy is being used: polarized light microscopy or electron microscopy. Each is explained below.

1. Polarized light microscopy (PLM).

Summary: Polarized light microscopy (PLM) can be used effectively to detect and identify asbestos in talc products because there are optical properties characteristic of cleavage fragments and other characteristics of asbestos fibers.

PLM employs plane polarized light to examine minerals. PLM is the primary tool used by geologists today to study rocks and rock powders, as it has been for a hundred years. In the study of powders, the samples are mounted in immersion oils of known index of refraction. Because minerals are crystalline, possessing a well-ordered arrangement of atoms, they will interact with polarized light in ways that change the nature of the light. These changes are referred to as optical properties. The optical properties of thousands of minerals are well documented and together they form a unique set that enables identification of most silicate and carbonate minerals. PLM is a powerful tool for the examination of talc products for asbestos and the identification of the minerals that compose it.

The ideal particle size for powdered minerals to be studied by polarized light microscopy is > 1 to about $150\text{ }\mu\text{m}$. Powdered talc I have seen ranges in size from about 1 to $200\text{ }\mu\text{m}$. Normally, it has passed through a 200 mesh sieve, making $74\text{ }\mu\text{m}$ the maximum middle dimension of particles in most cosmetic talc. My own examinations of body powders have found abundant large particles that are easy to study by polarized light microscopy. **It is these large particles that contain virtually all the mass of a powdered sample.**

The mineral forming EMPs can be identified by a set of well-established optical properties, and if asbestiform, bundles of even a few fibrils will exhibit optical properties that are anomalous (Verkouteren and Wylie, 2002). Figure 6 shows two EMPs photographed at the same magnification. Both are amphibole, but one is asbestos and one is a cleavage fragment. These particles typify their respective groups.

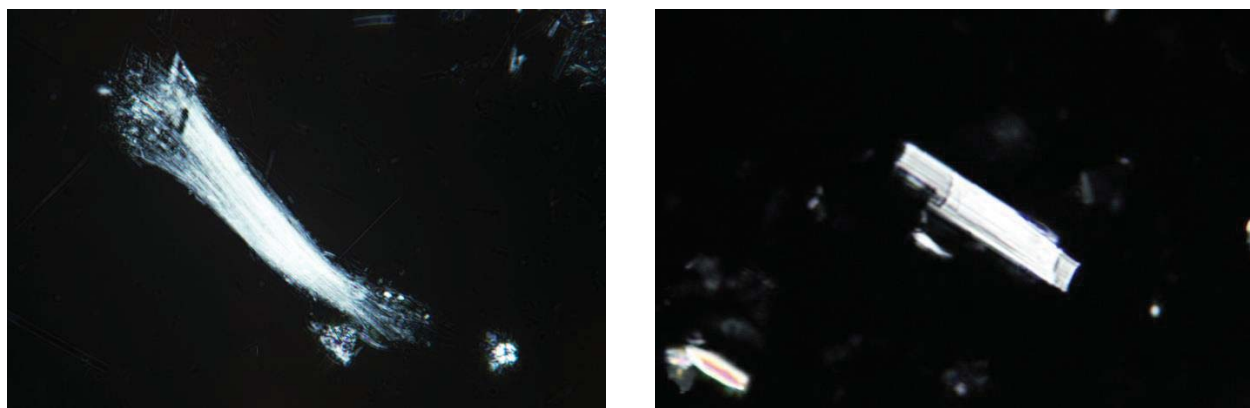


Figure 6. Tremolite. (a) Tremolite asbestos from Metsovo, Greece by PLM, crossed polars. The field of view is approximately $250\text{ }\mu\text{m}$ across and this particle is about $165\text{ }\mu\text{m}$ long. Many tiny, easily separable fibrils make up the particle (b) Tremolite from cosmetic talcum powder. The field of view is also about $250\text{ }\mu\text{m}$ and the particle is $70\text{ }\mu\text{m}$ long and $9\text{ }\mu\text{m}$ wide. It is not a fiber bundle.

The U.S. Environmental Protection Agency (EPA) polarized light microscopy (PLM) method (1993) specifies the characteristics of asbestos, summarized as follows: means aspect ratio (length/width) ranging from 20:1 to 100:1 or higher for fibers longer than 5 micrometers, very thin fibrils, usually less than 0.5 micrometers in width, and 2 or more of the following properties: fibers occurring in bundles, bundles displaying splayed ends, matted masses of individual fibrils and fibers showing curvature. These characteristics are evident in the asbestos shown in Figure 6(a).

The particle shown in Figure 6(b) is bounded by planes that have broken during grinding. It behaves as a single particle optically, so it is **not** composed of smaller fibrils. Its shape, surface morphology, length to width ratio and dimensions are characteristic of cleavage fragments.

If amphibole asbestos is present in cosmetic talc because it was in the ore and processed with the talc, it can be found by PLM. The high tensile strength of asbestos preserves long fibers, and fiber bundles would be expected among the larger particles. Furthermore, distinguishing between anthophyllite-asbestos and talc is straight-forward by PLM. The detection limit of amphibole in

talc by PLM is theoretically limited only by the number of analyses, but practically there is a limit, probably $< 0.01\%$, unless a procedure for concentrating amphibole, such as heavy liquid separation, is employed. PLM cannot be readily used to provide abundances on the basis of numbers of fibers/unit weight.

Summary: The optical photomicrographs of tremolite and anthophyllite found in the expert reports of Drs. Longo and Rigler document the presence of cleavage fragments. Particles labeled as bundles do not have features consistent with that designation.

The January 15, 2019, report of Drs. Longo and Rigler provides many photographs of EMPs labeled by Drs. Longo and Rigler as fibers and most commonly, fiber bundles of amphibole. Some were taken under polarized light and some showed dispersion in $n_D = 1.605$ oil. The particles labeled as bundles, however, do not display the characteristics of fiber bundles. Their optical properties and shape are consistent with cleavage fragments and inconsistent with asbestos. Their optical properties are those of single crystals, not composite fiber bundles. An example is shown in Figure 7. Furthermore, the data presented in the report are insufficient to differentiate anthophyllite from tremolite, as in one common orientation, tremolite will display parallel extinction, the only distinguishing characteristic mentioned by Drs. Longo and Rigler.

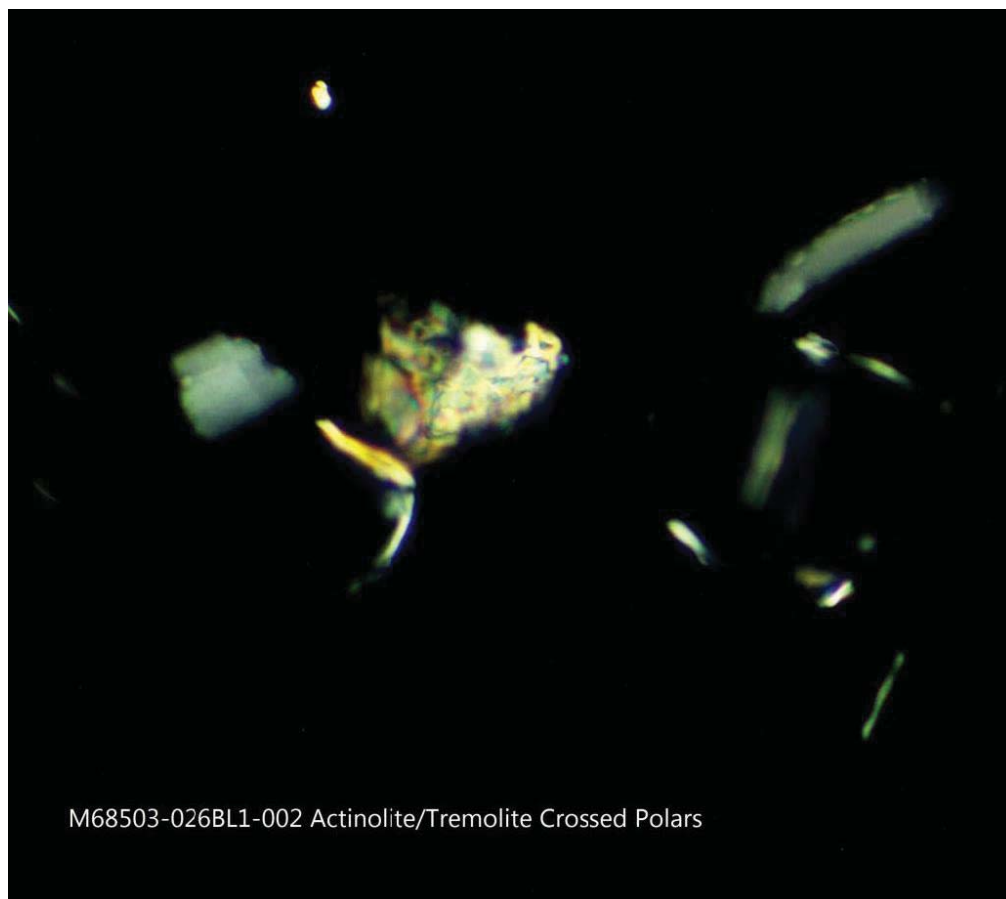


Figure 7. The particle in the upper right-hand corner is labeled as tremolite. The photograph was taken at 200X under crossed polars. The particle is about $40\mu\text{m}$ long. The uniform first order white interference color is indicative of a single crystal, not a fiber bundle.

2. Transmission electron microscopy (TEM).

Summary: Evidence of fiber bundles is lacking in Drs. Longo and Rigler's TEM photomicrographs labeled as tremolite and anthophyllite, despite the fact that the particles are called bundles. There is wide range in the width of particles identified as tremolite and anthophyllite and the particle shapes are consistent with a population dominated by cleavage fragments.

Electron microscopy may be used to detect amphibole in talc. The mineral identity of a particle viewed with an electron microscope is usually decided by particle shape, qualitative chemical composition as established by energy dispersive spectroscopy (EDS also known as EDXA) and atomic structure as determined from zone axis electron diffraction patterns.

The particles examined are usually the smallest in a sample, so bundle structures are less common and the uniformity of width of fibrils in one or sometimes two modes is evident. There are many data sets providing the lengths and widths of amphibole fragments and fibers available for study. In 2016, I published a paper using 35 sets of dimensional data gathered by electron microscopy (Wylie, 2016). Almost all of these data sets are publically available. These data sets demonstrate the ubiquity and abundance of fibrils longer than 5 micrometers with very narrow widths, $< 0.3 \mu\text{m}$, a characteristic lacking in Drs. Longo and Rigler's tremolite populations and largely absent in the EMP populations labeled as anthophyllite. Furthermore, none of Longo and Rigler's optical microscopy photographs of particles identified by them as anthophyllite demonstrate the presence of bundles of fibers that could disaggregate and form such fiber.



Figure 8. This photograph, taken from the Jan 15, 2019 report of Drs. Longo and Rigler, is reported to be a bundle. It appears to be a single crystal. No criteria are provided for designation as a bundle.

I found three particles out of more than 100 labeled as anthophyllite by Drs. Longo and Rigler that have Length > 8 μ m and Width < 0.25 μ m, widths and lengths inconsistent with a normal cleavage fragment population. I would need to see more evidence than that presented in the reports, however, to conclude that they are anthophyllite fibers. Talc, sepiolite, jimthompsonite, clinojimthompsonite and chesterite, all magnesium silicates which occur together, may also form fibers. There has been no evidence presented by optical microscopy that fiber bundles of anthophyllite are present, and it has not been reported from the mine.

3. Aspect ratio.

In general, to determine if a particle is asbestiform, one cannot simply calculate its aspect ratio. Aspect ratio does not tell anything about actual size, only relative size. Aspect ratio has no dimension. Characteristic of both asbestos and cleavage fragment is an increase in aspect ratio with increasing length, i.e., longer EMPs have higher aspect ratios. Differences or similarities in aspect ratio frequencies may, therefore, be due to differences in length frequencies rather than habit.

4. The anthophyllite asbestos-talc controversy.

Summary: Transmission electron microscopy techniques do not readily distinguish between EMPs of talc and anthophyllite. PLM is the most reliable instrument to make this distinction.

From both transmission electron microscopy (TEM) and scanning electron microscopy (SEM), we can obtain dimensions and much information about chemical composition of mineral particles, except their water content. The lack of information on water content has resulted in much confusion about identification of anthophyllite and talc in fiber by electron microscopy. Talc contains about 5% water, and anthophyllite contains 2%. These two minerals have almost the same ratio of MgO to SiO₂, similar electron diffraction patterns in certain orientations and both can form fibers. To confuse the matter more, in the industrial talc from the unusual deposits of Gouverneur, NY, not only are there fibers of mineral talc, but also, in small quantities, fibers formed of intergrowths of talc, anthophyllite and other chain silicates occur, and in eastern Vermont, the Mg silicates chesterite (prismatic), jimthompsonite (prismatic), and clinojimthompsonite (fibrous) have been found in altered serpentinites between the chlorite and the actinolite zones.

In order to distinguish between talc and a fiber of anthophyllite by TEM, one must follow carefully the ISO 10312 TEM method or other approved method that specifies that a fiber should be classified on the basis of morphology and EDXA composition, but also specifies that a list of minerals consistent with that composition be made. A zone-axis selected area electron diffraction (SAED) pattern should be tested for consistency with the crystal structure of the suspected mineral, but also tested for inconsistency with crystal structures of the other minerals of similar composition. If this requirement is not followed, there is no reliable method to tell if a particle is anthophyllite or talc. I did not see any evidence that Drs. Longo and Rigler did such testing, and therefore the distinctions between anthophyllite, talc, and other Mg-silicates may be unreliable.

G. Differences in talc ore deposits and the distinctive and well-studied cosmetic talc deposits in Southern Vermont and Northern Italy.

Summary: Based on their geologic settings, reports from mine geologists and literature descriptions of the ore deposits providing cosmetic talc for Johnson's Baby Powder and Shower to Shower, it is highly unlikely that asbestos could be found in the talc products from these mines.

Talc may form without amphibole or serpentine forming in the ore. Talc without amphibole occurs when temperatures and/or fluid pressures were not high enough for amphibole to form. Talc without serpentine means the temperatures were too high and/or fluid pressure too low for serpentine to form or remain stable. However, talc deposits may form over a range of temperature and fluid pressures accompanied by migration of chemical elements, so amphibole, talc and serpentine can be present together in those circumstances, as explained below.

During metamorphism (the changing of one rock type to another), the set of minerals in a rock is determined by temperature, pressure and the chemical components available.¹ The number of such minerals will normally not be very large. The metamorphic mineral groups most likely to be found in and around talc ore are: chlorite, amphibole, carbonate, sepiolite and serpentine. Quartz, iron oxides and sulfides are known in some places. To minimize these accessory minerals in cosmetic talc products, talc ore is selectively mined for the highest talc content, and then it may be subject to purifying processes such as flotation, magnetic separation and air classification.

There are two types of talc ore deposits:

- A. Talc ore formed from alteration of ultramafic rock (Type I). Ultramafic rocks that host talc deposits are much richer in Mg and lower in Si, Ca, K, Al and Na than average crustal rock. There are two types of ultramafic rock that serve as hosts to the talc ore: Serpentinite (Type Ia) and Ultramafic Igneous Rock (dunite, peridotite) (Type Ib). Type Ia includes the deposits of Southern Vermont used in the cosmetic talc products at issue in this litigation.
- B. Talc formed from alteration of Mg-rich carbonate rocks (limestone, dolomite) by fluids (Type II). There are three subtypes based on source of fluids: a) Type IIa: regional metamorphism, b) Type IIb: a proximal igneous body, and 3) Type IIc: distal igneous body. The deposits of the Chisone Valley, Italy used in the cosmetic talc products at issue are probably of Type IIc.

¹ During metamorphism, physical and chemical conditions may change rapidly and equilibrium may not be attained. Detailed lattice imaging studies of minerals from these environments by high resolution electron microscopy have revealed a world that can be much more complex than I describe herein, in which it is assumed that particles found in talc products are made up of a single mineral. At the sub-micron scale, amphibole, talc, and a family of single, double, quadruple chain and sheet silicates, and combinations of these, may be intergrown within a single particle. We know this is true from studies of fibrous talc from New York and the talc-amphibole-biopyrobole intergrowths from Chester, Vermont (Veblen and Busek, 1980). However, detailed studies by high resolution TEM are limited and unless evidence is found otherwise, particles in mineral powders are normally considered to be single minerals.

While the minerals associated with talc in both Type I and Type II may be the same (carbonate minerals, chlorite, talc, tremolite, actinolite, serpentine, anthophyllite, olivine, mica and quartz), there is a great deal of variability in presence and abundance of these minerals among talc deposits. There is also variability in the likelihood of finding asbestos associated with talc ore. While the ore from every talc mine or mining district may fit into the classification scheme outlined above, in fact, every deposit is unique in some way(s). In the section below, I will give examples, paying particular attention to the characteristics of deposits mined for cosmetic talc.

1. TYPE Ia: Serpentinite host.

Cosmetic talc ores in Southern Vermont utilized in the talcum powder products at issue are examples of talc ores formed from the alteration of **serpentinite**, a rock composed almost exclusively of the serpentine minerals.

Serpentinite blocks altered during regional metamorphism lose water to surrounding rock and gain Si and CO₂ (among others) from it. This process results in the formation of a series of layers, or zones, dominated by a single mineral encircling the serpentinite. These separate and discrete zones extending outward from the serpentinite core are illustrated in Figure 9, which is taken from the work of Sanford (1982). For the levels of metamorphism known as “greenschist and epidote-amphibolite facies,” the amphibole is tremolite-actinolite. For higher levels of metamorphism, the amphiboles will be actinolite, hornblende and anthophyllite.

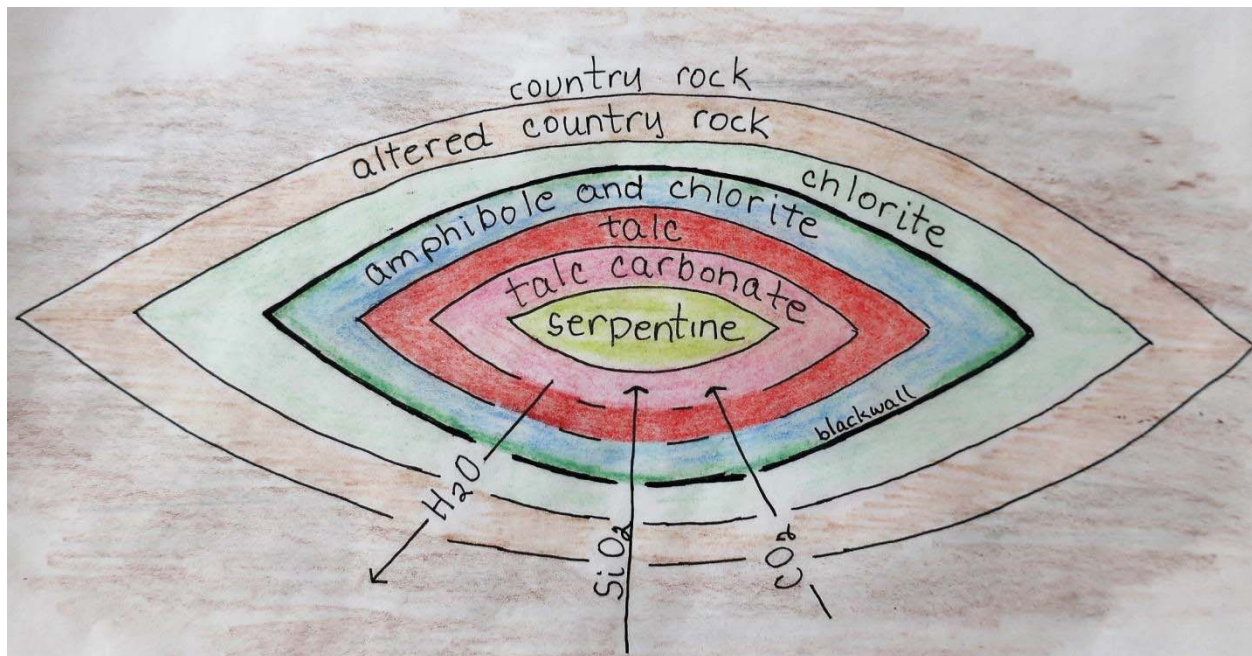


Figure 9. Idealized blackwall metasomatism and the formation of talc from serpentine with chemical exchanges to form talc and talc carbonate from serpentine. Ca and Fe may enter to form amphibole, and, in some instances, Mg will leave. The original boundary before metasomatism is labeled “blackwall.” As the serpentinite was heated, water was driven out, and Si was driven in, forming the layers. Cosmetic talc ore is mined from talc zone. The talc carbonate zone is called “grit.”

It is the contrast in initial chemical composition of the serpentinite and the surrounding sediment and the availability of water from the serpentinite as it dehydrates during metamorphism that results in the limited mineralogy of these well-defined zones. The transformation is referred to as **black wall metasomatism** for the black color of the chlorite rich zone at the contact with amphibole-chlorite. The chlorite-amphibole/chlorite boundary marks the contact between the original serpentinite and surrounding rock. If amphibole asbestos were to form during metasomatism, it would be most likely deposited by hot fluids escaping the dehydrating serpentinite and well outside the talc zone. In fact, I have seen amphibole asbestos in veins in rock surrounding a large talc free serpentine body in Maryland.

It is common for one or more of the expected blackwall zones to be absent. For example, amphibole may not form at all if temperatures do not rise high enough. Zones may vary a great deal in thickness, from inches to many feet. Only when the talc zone is large and pure enough is it considered ore. Furthermore, although referred to as a single mineral zone, the boundaries are not perfect, and even under careful mining of high-grade talc ore, they might be breached, and trace quantities of amphibole, chlorite or carbonate rock incorporated in talc ore from time to time.

Talc ore formed from serpentinite may contain trace amounts of iron oxides, and/or sulfides, which were part of the original ultramafic rock. If present, the ore may be treated at the mine to remove them.

There is nothing about the mode of formation of this type of talc deposits that favors the formation of asbestos. However, because Mg-rich rocks can be hosts for asbestos, and because asbestos deposits are localized, and because during the 350 million years that have elapsed since these talc deposits formed, periods of faulting may have occurred, each deposit must be considered independently, and regular examination of the mine and mill products is necessary to ensure its absence as mining progresses.

Comments on Windsor County talc deposits:

Dr. Fred Pooley, a distinguished mineral scientist from the Department of Mineral Exploitation, University College Cardiff, UK, visited the talc mines owned by Windsor Minerals in Southern Vermont in 1972. It is my understanding that the ore from this mine was the source of some of the talcum powder products involved in this litigation. He and his team examined the samples he collected from throughout the mine, including ore and foot and hanging wall, and examined them by PLM, X-ray diffraction and transmission electron microscopy. According to his report (Pooley, 1972), **there were no asbestiform amphiboles or chrysotile detected.** Pooley does not report the presence of anthophyllite. Non-asbestiform tremolite and actinolite near the unmined edges of the formation were reported, but amphibole is not disseminated throughout the talc ore. The inner zone is talc high enough in purity to be suitable for cosmetic use. His observations are consistent with the presence of well-defined mineral zones, as would be expected in this type of deposit, enabling the amphibole zones to be avoided in mining or be wasted (discarded as waste rock). The mineralogy of the Windsor mine places it in the “epidote amphibolite facies” of metamorphism as is so well described by the pioneering models in Sanford (1982).

Pooley's detailed descriptions are consistent with published descriptions of talc mines in the Ludlow, Vermont area. The minerals list in the ore from several mines, including the Argonaut mine, by Mindat.org are: apatite, chromite, actinolite, chlorite, magnetite, and magnesite. Chidester et al (1951) describe a large, well-defined mass of actinolite in the Hammondsville mine along the edge of the orebody. Gillson (1927) described the actinolite in talc ore from Windsor County as showing "no effect of stress during deformation" (the lack of asbestos fiber would be consistent). The geologists writing these early reports were well aware of asbestos and the fact that it is not mentioned means it was not observed.

2. Type IIc. Carbonate Host: Distal igneous source.

Cosmetic talc ores in Italy used for Johnson's Baby Powder and Shower to Shower are examples of the alteration of a carbonate by heat and fluids from a distant source. In this category are the Regal, Treasure and Yellowstone mines in southwest Montana, the Italian mines at Chisone Valley, and the talc mines of the Allamore talc district of Texas. The cosmetic talc mines in China may also be of this type. If amphibole is absent, as Van Gosen reports for the Montana deposits (Van Gosen et al., 2004), temperatures were not likely not high enough for formation of tremolite. If tremolite is present but uncommon, as is the case for Italy and Texas, its formation was limited in some other manner, such as the abundance of Ca. Sepiolite fiber is known from Montana, as is fibrous talc (Greenwood, 1998), but these fibers were likely fiber-forming events at temperatures too low for amphibole fiber to form.

There is nothing about the mode of formation of this type of talc deposits that favors the formation of asbestos. However, because Mg-rich rocks can be hosts for asbestos, because asbestos deposits are normally localized, and because it is possible for asbestos to form long after the talc deposit was formed, each deposit must be considered independently, and regular examination of the mine and mill products is necessary to ensure its absence as mining progresses. **However, this type of deposit is not known for associated asbestos.**

Comments on the Val Chisone, Italy, talc deposits.

In 1972, the Department of Mineral Exploitation at University College Cardiff examined hand specimens and powders from an Italian mine, which I understand provided talc product for the talcum powder products at issue (Lightfoot et al., 1972). The team was led by distinguished mineral scientist Dr. Fred Pooley. The samples were studied by PLM, TEM and X-ray diffraction. Pooley and his team found tremolite only in association with carbonate, which could be found as nodules in the ore and elsewhere and wasted. They did not report tremolite in powdered talc ore. They did not report anthophyllite. They did not find tremolite-asbestos. They did not find chrysotile asbestos. They did report fibrous (but not asbestiform) talc.

Greco and Pelizza (1984) report on a visit to the Fontane mine from Val Chisone, Italy. They mention wasting inclusions. Sandrone and Zucchetti (1988) reported on the geology of the Val Chisone (Pinerolo District) cosmetic talc mines. They noted the same accessory minerals reported elsewhere by Dunning et al (1989): zoisite, epidote, rutile, sphene, tremolitic amphibole, quartz and pyrite. **There are no reports of asbestos.** The mineralogy is consistent with the "greenschist" and "epidote amphibolite" levels of metamorphism, where anthophyllite is not expected to form.

3. When is asbestos likely to be found in talc ores?

Summary: The formation of talc does not require or favor the formation of asbestos in the ore.

Asbestos is uncommon, but it is known to favor Mg-rich rocks. While all types of talc deposits can be asbestos-free, some types of talc deposits are more likely to be accompanied by amphibole asbestos than others in the immediate surroundings, although not necessarily in the ore. Amphibole-asbestos is known to be associated with deposits of Type Ib, Type IIa and Type IIb. These generalizations may not apply if there is superimposed on a talc deposit later tectonic events that favor fiber formation, such as faulting or igneous intrusions, but the well-defined planar features of faulting and the presence of igneous rock would be evident during mining and are rare.

Chrysotile forming veins of asbestos has not been reported in cosmetic talc ore to my knowledge.

H. Initial regulation of asbestos.

Summary: In rushing to deal with the asbestos problem of the 1960s, OSHA oversimplified its regulations, and in so doing, confused the distinctions between asbestos and cleavage fragments. Today, all regulatory language specifies the asbestiform habit, and by regulatory policy and practice, regulatory bodies do not regulate cleavage fragment EMPs as asbestos.

In the first regulatory definition of asbestos from OSHA in 1971, the critical distinction of minerals that form in the asbestiform habit was made for serpentine and the amphibole minerals riebeckite and grunerite when they were identified as chrysotile, crocidolite and amosite, terms for specifically designating the asbestiform habit. OSHA did not, however, draw that distinction for the amphiboles tremolite, actinolite and anthophyllite. More concerning is the fact that OSHA neglected other amphiboles that occur as asbestos and cause asbestos related diseases. Instead, OSHA simply defined asbestos as a particle of one of three asbestos types (amosite, crocidolite or chrysotile) or a particle of one of three minerals (tremolite, actinolite or anthophyllite) with a length of greater than 5 microns and an aspect ratio of 3:1 or greater.

This designation of size and shape was selected as part of a counting strategy, principally to eliminate clearly nonfibrous “particulates” from assays and to improve both the precision and accuracy of fiber counting on air filter from an area of known asbestos manipulation. The federal regulatory definition was written without adequate consultation with the mineral experts at the United States Geological Survey or the U.S. Bureau of Mines, and, consequently, it was not mineralogically valid as a description of mineral fiber.

Although the counting criteria were not mineralogically specific for asbestos, its use was not an issue when the definition was employed in measuring levels of exposure only to asbestos known to be present in the dusts. Most in the mining and construction industries never thought that counting criteria could become a definition that transformed ordinary rock fragments into asbestos. In essence, this was not an issue in 1971 when the definition was employed in measuring levels of exposure in areas where asbestos was known to be present. However, monitoring was expanded to areas where both asbestiform and non-asbestiform dusts could be present, and problems with the counting definition emerged.

In 1992, OSHA conducted a review of the health effects of inhalation of non-asbestiform amphiboles. The process included weeks of oral testimony and the submission of written documents from industry, academia, and other regulatory bodies such as NIOSH. I participated in these hearings, and presented data gathered at the University of Maryland and the US Bureau of Mines Research Center in College Park. The work at the University of Maryland was funded by the Bureau of Mines, which was interested in identifying asbestos in mining and differentiating it from the many EMPs commonly found there. The agency determined that “available evidence supports a conclusion that exposure to non-asbestiform cleavage fragments is not likely to produce a significant risk of developing ‘asbestos-related’ disease” (Federal Register, v. 55, no. 29, February 12, 1990, p. 4939). Consequently, OSHA removed them from the asbestos standard, and to this day, OSHA and The Mining Safety and Health Administration (MSHA) continue to discriminate fragments from mineral fiber (Crane, 2018).

The regulatory landscape since 1971 has changed, and today, differences between amphibole and asbestiform amphibole (i.e., asbestos) are recognized in all regulatory definitions of asbestos. The MSHA states that its regulations apply to “asbestiform hydrated silicates that separate into flexible fibers made of fibrils,” and the EPA applies asbestos regulations to “the asbestiform varieties of: Chrysotile (serpentine); crocidolite (riebeckite); amosite (cummingtonite-grunerite); anthophyllite; tremolite; and actinolite” (40 CFR 763.83).

In their 2001 *Toxicology profile for asbestos*, the **U.S. Agency for Toxic Substances and Disease Registry (“ATSDR”)** states: “Asbestos is the name given to a group of six different fibrous minerals (amosite, chrysotile, crocidolite, and the fibrous varieties of tremolite, actinolite, and anthophyllite) that occur naturally in the environment... Asbestos minerals consist of thin, separable fibers that have a parallel arrangement. Nonfibrous forms of tremolite, actinolite and anthophyllite also are found naturally. However, because they are not fibrous, they are not classified as asbestos minerals” (2001.09 - ATSDR Toxicological Profile for Asbestos).

The National Institute for Occupational Safety and Health (“NIOSH”) published a **Roadmap for research on asbestos in 2011** (2011.04 – NIOSH Roadmap). In it, NIOSH defines “asbestos” as “a term used for certain minerals that have crystallized in a particular macroscopic habit with certain commercially useful properties,” and “asbestiform” as “a term applied to minerals with a macroscopic habit similar to that of asbestos.” NIOSH expressly clarifies that non-asbestiform minerals are not “asbestos” or “asbestos minerals.” I served as a reviewer for NIOSH on the first public draft of this document. I believe it introduced the term EMP to make it clear that just because a mineral is elongated and meets the definition of a fiber under asbestos monitoring protocols, it need not be asbestos.

The **U.S. Geological Survey** is the government agency tasked with providing information on rocks and minerals for the nation. In its publication, *Some Facts about Asbestos* (2001.03 – Some Facts about Asbestos), the USGS states: “Asbestos is made up of fiber bundles. These bundles, in turn, are composed of extremely long and thin fibers that can be easily separated from one another. The bundles have splaying ends and are extremely flexible.” The document recognizes that this property may not be evident in every particle, presenting difficulties in discriminating among between cleavage fragments and asbestos fibers. *“To resolve this problem, the analyst can compare the shapes of several hundred amphibole particles in the sample with those of*

asbestos reference materials and determine whether a sample is asbestiform with a fair degree of certainty.” This is the approach I take in studying amphibole.

The **World Health Organization** (WHO) has also made it very clear that elongated amphibole particles may be asbestiform or cleavage fragments. The International Agency for Research on Cancer (IARC), an agency of the WHO, published a definition of asbestos in 1977, restricting it to the asbestiform habit. “Asbestos is the generic name used for a group of naturally occurring mineral silicate fibres of the serpentine and amphibole series. Government agencies in various countries, and industrial groups, currently characterize six fibrous silicates as ‘asbestos’: the fibrous serpentine mineral chrysotile and the fibrous amphiboles actinolite, amosite, anthophyllite, crocidolite and tremolite” (IARC, 1977). In 2010, in its monograph on talc, IARC stated: “Asbestos is a commercial term that describes six minerals that occur in the asbestiform habit: actinolite, anthophyllite, chrysotile, grunerite, riebeckite and tremolite. Similarly to talc, these six minerals occur more commonly in a non-asbestiform habit, and may also be elongated without being asbestiform. Actinolite, anthophyllite and tremolite may occur in some talc deposits; when asbestiform, they constitute asbestos and, when not asbestiform, they are referred to as mineral fragments or cleavage fragments” (IARC, 2010 p. 277). I participated in the workgroup that wrote the monograph on talc, and the need to distinguish between these habit forms of amphibole was discussed extensively.

IV. CONCLUSION

There are significant differences between amphibole particles that form as asbestos (asbestos fiber) and those that form from crushing rock (cleavage fragments) including the way they form, the nature of their surfaces, their dimensions, and the occurrence in bundles. Applying only the criteria length > 0.5 µm and length:width of 5:1 or greater as discriminating criteria is scientifically unreliable and invalid.

Talc, a component of cosmetic and industrial talc products, is a mineral that is formed by alteration of Mg-rich rocks. Talc for cosmetic use is mined in only a few places because of the stringent requirements for the product.

Amphibole and serpentine are different but common rock-forming minerals that are hydrated and can be found in Mg-rich rocks. Both occur only rarely as asbestos. Amphiboles that form in the asbestiform habit (e.g., asbestos) exhibit special properties that are different from those same amphiboles that otherwise form in nature. Although talc and asbestos can form in proximity to one another, the formation of talc does not require or favor the formation of asbestos in the ore. Based on their geologic settings, reports from mine geologists, and literature descriptions of the ore deposits used to source the talc for the cosmetic talc products at issue in this litigation, it is unlikely that asbestos occurs in these deposits.

While amphiboles, talc and other minerals may form elongated fragments when they are broken during mining, mineral processing and rock and soil excavation, these fragments are *not* “asbestos,” or “asbestiform” because they do not have the properties of asbestos. Amphibole populations of asbestos fibers and cleavage fragments have distinctive optical properties, dimensions and habit. There are two types of microscopy used in making this distinction. Polarized light microscopy (PLM) can be used effectively to detect and identify asbestos in talc

products because there are optical properties that are characteristic of cleavage fragments and others that are characteristic of asbestos. Electron microscopy may be used to identify dimensions and habit.

The reports provided by Drs. Longo and Rigler examining the talcum powder products at issue do not present evidence consistent with the optical properties, dimensions or habit of asbestos. Instead, the photomicrographs found in their reports document the presence of cleavage fragments. In addition, the particles Drs. Longo and Rigler have labeled as bundles do not have morphology consistent with that designation (i.e., they are not bundles). As a result, Drs. Longo and Rigler's conclusions are scientifically unreliable.

Further, contrary to the reports provided by Drs. Longo and Rigler, one cannot simply calculate a particle's aspect ratio to determine whether a particle is asbestiform. This is not a scientifically valid approach because aspect ratio does not tell anything about actual particle size, only relative size, and has no dimension. An increase in aspect ratio with increasing length is a characteristic of both asbestos and cleavage fragments. Thus, differences or similarities in aspect ratio frequencies cannot, in isolation, be used to determine whether a particle has an asbestiform habit. In addition, the transmission electron microscopy (TEM) techniques utilized by Drs. Longo and Rigler are scientifically unreliable because they do not readily distinguish between EMPs of talc and anthophyllite. PLM is the most reliable instrument to make this distinction.

In rushing to deal with the asbestos problem of the 1960s, OSHA oversimplified its regulations, and in so doing, confused the distinctions between asbestos and cleavage fragments. As a result, analytical protocols developed for occupational monitoring for airborne fiber during asbestos use for determination of clean air after removal of asbestos from school buildings are overly broad and will produce false positives for mineral fiber when applied to rock powders. Indeed, such regulatory criteria ignore the fundamental characteristics of asbestos. Many naturally occurring minerals will form elongated particles that meet regulatory criteria for fiber even though they do not have the optical properties, dimensions and habit of asbestos. Notably, current regulatory language specifies that asbestos materials are limited to those that form in the asbestiform habit, specifically.

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Depositions and Exhibits

Deposition of William Longo, Nov. 6, 2018

Deposition of William Longo, Nov. 27, 2018

Deposition of William Longo, Dec. 5, 2018

Deposition of William Longo, Feb. 5, 2019, and Exhibits

Deposition of Rigler, Feb. 6, 2019, and Exhibits

Deposition of William Longo, Oct. 24, 2018

Deposition of William Longo, Oct. 31, 2018

Deposition of William Longo, Jan. 7, 2019

EXHIBIT A

CURRICULUM VITAE

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1. PERSONAL INFORMATION

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Major: Economic Geology
Minors: Mineralogy, Mining Engineering, and
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B.A. 1966 Wellesley College, Wellesley, Massachusetts
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Employment:

a. Academic:

October 2014 – present	Professor Emerita
March 1, 2014 – June 30, 2014,	Interim Vice President for Information Technology and Chief Information Officer
Oct 2012 – January 2014	Special Advisor to the President for MPower, UMD
Oct 2012 – June 2014	University Marshall
2011-Oct.2012	Senior Vice President and Provost, UMD
2009- 2011	Vice President for Administrative Affairs, UMD
2008 – 2009	Interim Vice President for Administrative Affairs, UMD
2004-2006	Interim Dean of the Graduate School, UMD
2002-2008	Assistant President and Chief of Staff, UMD

2000-2002	Associate Provost, UMD
1998-2000	Acting Associate Dean, College of Computer, Mathematical and Physical Sciences, UMD
1996-1997	Undergraduate Director, Department of Geology, UMD
1992-2014	Professor, Department of Geology, UMD
1990-1994	Associate Chairman and Director of Graduate Studies, Geology Department, UMD
1989-1990	Acting Chairman, Geology Department, UMD
1986-1987	Special Assistant to the Dean for Graduate Studies and Research, UMD
1984-1986	Acting Associate Dean for Research, Graduate School, UMD
1977-1992	Associate Professor, Department of Geology, UMD
1973-1977	Assistant Professor, Department of Geology, UMD
1972-1973	Assistant Professor, Department of Agronomy, UMD
1967-1969 1970-1971	Preceptor, Geology Department, Columbia University
1966-1967	Teaching Assistant, Geology Department, Columbia University

b. Other Positions:

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2. Research, Scholarly, and Creative Activities

a. Books

i. *Chapters or Articles in Books:*

Gilbert, J. Ann (1967) "Units, Numbers, Symbols and Constants", Encyclopedia of Atmospheric Sciences and Astrogeology, Rhodes Fairbridge (ed.). Reinholt Publishing Company, p. 1049-1062.

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b. Edited publications

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b. Articles in Refereed Journals

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e. Abstracts and Professional Papers presented

Gilbert, Jean Ann and P.J. Ypma (1969) "The Use of an Electro-Optical Compensator for the Determination of the Optical Properties of Opaque Minerals Under the Microscope", GSA Annual Meeting, Atlantic City, New Jersey.

Siegrist, H.G. and A.G. Wylie (1979) "Characterizing and Discriminating the Shape of Asbestos Particles", GSA Annual Meeting San Diego, California.

Invited

Wylie, A.G. and P. Schweitzer (1980) "The Effects of Grinding on the Shape of Wollastonite Particles". Symposium on Electron Microscopy and X-ray Applications to Environmental and Occupational Health Analysis, Penn State.

Huggins, C., A.G. Wylie and W. Campbell (1980) "Preparation and Selected Properties of Amosite, Chrysotile, Crocidolite and Non-fibrous Tremolite for Use in NIEHS Oral Ingestion Studies". Symposium on Electron Microscopy and X-ray Applications, Penn State.

Rosemeier, R.G., M.E. Taylor and A.G. Wylie (1981) "Low Cost 210K Gain Transmission Electron Microscope Image (TEMI) Intensifier". Electron Microscopy Society of America, Annual Meeting, Atlanta.

Virta, R., K. Shedd, A.G. Wylie and J. Snyder (1981) "Size and Shape Characteristics of Amphibole Asbestos and Amphibole Cleavage Fragments Collected on Occupational Air Monitoring Filters". Proceedings of the International Symposium on Aerosols in the Mining and Industrial Work Environment, University of Minnesota USBM-NIOSH, Minneapolis, Minnesota.

Broadhurst, C.L., Candela, P.A., Wylie, A.G. and Burke, T.M. (1983) "A Geochemical Study of the Host Rocks of the Copper-Iron-Cobalt Ores of Sykesville, Maryland: An Ultramafite-Associated Deposit. Geol. Soc. Am. Natl. Meeting, November, (1983).

Burke, T.M., P.A. Candela, and A.G. Wylie (1985) "Evidence for Detrital Ultramafic Bodies in the Eastern Piedmont of Maryland". Geol. Soc. of America Northeastern Section, March (1985).

Wylie, A.G., P.A. Candela and T.M. Burke (1985) "Genesis of High-zinc Chromite and Associated Cobalt Mineralized Blackwall in the Sykesville District, Maryland Piedmont". Geol. Soc. of Amer. National Meeting, November (1985).

Muller, P.D., Candela, P.A. and A.G. Wylie (1985) "Liberty Complex: Polygenetic Melange in the Central Maryland Piedmont". Geol. Soc. of Amer. National Meeting, November (1985).

Invited

Candela, P.A. and Wylie, A.G. (1987) "The Geology of Radon in the Maryland Piedmont: The Development of a Research Plan". Southwest Geol. Soc. Amer.

Candela, P.A., Wylie, Ann G. and Muller, P. (1987) "Ore Deposits as Tectonic Indicators in Melange Terrane". AGU.

Wylie, A.G., Candela, P.A. and Burke, T.M. (1987) The Genesis of Ultramafite-Associated Fe-Cu-Co-Zn-Ni Deposits of the Sykesville District, Maryland Piedmont". Southeast Geol. Soc. Amer.

Linder, D.E. and Wylie, A.G. (1988) "Zeolites from the Paleozoic Metavolcanic James Run Formation, Piedmont Province, MD" Southeast Geol. Soc. Amer.

Invited

Wylie, A.G. "Discriminating Amphibole Cleavage Fragments from Asbestos: Rationale and Methodology. Abstracts of Communication. VII International Pneumoconiosis Conference, Aug. 23-26,1988. Pittsburgh, NIOSH-ILD-BOM-MSHA-OSHA, p. 124.

Invited

Wylie, A.G. (1989) "Distinguishing Tremolite-Asbestos from Tremolite Cleavage Fragments on a Light Optical and Morphological Basis", VII International Pneumoconiosis Conference Proceeding of Workshop: Hazard Recognition of Mineral Dust. Pittsburgh, NIOSH-ILD-BOM-MSHA-OSHA.

Invited

Wylie, A.G., (1989) Fiber Mineralogy and Identification. Society of Mining Engineers Annual meeting

Wylie, A.G., Linder, D. and Candela, P. (1990) "Sedimentary Features of Appalachian Serpentinites". Geol. Soc. of Amer. National Meeting, Nov. (1990), p. A230.

Invited

Skinner, C. and Wylie, A. (1990) "Fibrous Tremolites". Bloss Symposium, VPI, Blacksburg, Virginia.

Invited

Wylie, A.G. (1992) The Analysis of Industrial Mineral Products for Crystalline Silica by Optical and Electron Microscopy. The Measurement of Crystalline Silica International Symposium, August (1992).

Wylie, A.G. (1993) The Fractal Distribution of the Mass of Asbestos Fiber and its Application to the Analysis of Industrial Minerals. Geological Society of America Annual Meeting, Boston.

Verkouteren, J.R. and Wylie, A.G. (1994) "Anthophyllite, Tremolite, and Actinolite Asbestos: Reference Materials and Optical Properties" Inter/Micro 94, Chicago.

Verkouteren, J.R., Wylie, A.G., Steel, E.B., Lim, M.S. (1995) "Analysis of the Tremolite-Actinolite Series using High Precision Refractive Index Measurements". Microbeam Analysis.

Invited

Wylie, A.G. (1996) Factors Affecting Risk from Biologically Active Minerals. Proceedings Society of Mining, Metallurgy & Exploration Symposium. Mineral Dusts: Their Characterizations and Toxicology. Washington DC 33-46

Invited

Wylie, A.G. (1997) "The Habit of Asbestiform Amphiboles: Implications for the Analysis of Bulk Samples" 1997 Boulder Conference: Advances in Environmental Measurement Method for Asbestos. University of Colorado, Boulder, July 13-17 (1997).

Verkouteren, J.R. and A. G. Wylie (2001) "Microdiffraction Analysis of Fibrous Talc: Asbestos in Crayons". 2001 Denver X-ray Conference, Steamboat Springs, Colorado, USA, August 2, 2001.

Piccoli, P.M., DeHarde, A., Wylie, A.G. (2001) "Recycling coal Combustion Byproducts: a Laboratory Study to Evaluate Grout Formulations for Use in the Kempton Mine Complex, Western Maryland. Geological Society of America, Abstracts with Programs.

Verkouteren, J.R. and A.G. Wylie (2001) "Identification of Tremolite-Actinolite Asbestos". 2001 Asbestos Health Effects Conference, May 24-25, 2001, Oakland, CA.

Verkouteren, J.R., A. G. Wylie, E. Windsor, J. Courny, R. Perkins, T. Ennis (2002) "Powder X-Ray Diffraction for Asbestos Analysis". International Centre for Diffraction Data. Annual Meeting of Members, ICDD Headquarters, Newtown Square, PA, March 20, (2002).

Greenwood, W. and A.G. Wylie (2002) "The Optical Properties and Chemical Composition of Fibrous Talc". ASTM Johnson Conference, July 21-25, Johnson, Vermont.

Verkouteren, J.R., and A.G. Wylie (2002) "A PLM Method for Quantitative Analysis of Amphibole Asbestos in Bulk Materials at 0.01 wt.%". ASTM Johnson Conference, July 21-25, Johnson, Vermont.

Verkouteren, J.R. and A.G. Wylie (2002) "Optical Characteristics and Mineralogy of Environmental Amphibole Asbestos", ASTM Johnson Conference, July 21-25, Johnson, Vermont.

Verkouteren, JR and A G Wylie "Micro-diffraction Analysis of Fibrous Talc: Asbestos in Crayons. Denver x-ray conference.

Crummett, C.D., Candela, P.A., Wylie, A. G., and Earnest, D.J. (2004) "Examination of the Thermal Transformation of Chrysotile by Using Dispersion Staining and

Conventional X-ray Diffraction Techniques”. AGU Fall Meeting, V41C-1405.

Earnest, D. J., Candela, P.A., Wylie, A. G., Crummett, C. D, Frank, M. (2004)
“Synchrotron Radiation Study of the Kinetics of Dehydration of Chrysotile Fiber”. AGU
Fall Meeting, V23C-06.

Frank, MR, Candela, PA, Earnest, DJ and Wylie, AG, Wilmot, M, Maglio SJ (2005)
Experimental Study of the Thermal Decomposition of Lizardite up to 973 K, GSA
Annual Meeting

Kerrigan, RJ, Candela, PA, Piccoli, PM, and Wylie, AG, (2007), Growth of Fibrous Talc
and Anthophyllite in the Hydrothermal Diamond Anvil Cell (HDAC), American
Geophysical Union Fall Meeting, December 10-14, 2007, San Francisco.

Taylor, ES, **Lower, SK, Wylie, AG, and Mossman, BT**: The strength of disease: molecular
bonds between asbestos and human cells, EOS Trans. AGU, 89(53): B53B-0479, **2008**.

Schwartz, C.W., Wylie, A.G., Davis, A.P., and James, B.R., (2009), Column Expansion
Testing of Chromium tailings Subgrade Fills, International Foundation Congress and
Equipment Expo, March 15019, Orlando, FL, 8 pages.

Invited

Wylie, A.G. (2010) Mineralogical Characteristics of Asbestos. GSA meeting,
Northeastern/Southeastern sections, Baltimore.

Taylor E, Mossman BT, Wylie AG, Lower SK. (2010) Molecular Methods for the
induction of Mesothelioma by Asbestos. GSA meeting Northeastern/Southeastern
sections. Baltimore.

Taylor, ES, Lower SK, Mossman, BT and Wylie, AG, 2011. Molecular methods for the
Induction of mesothelioma by Asbestos. Biophysics Journal 100. P160a.

Invited

Wylie, A. G. (2013) A Review: Mineralogy and dimensional characteristics of
amphiboles from the vermiculite deposit, Rainy Creek Complex, Libby, Montana. GSA
meeting Northeastern Section, Bretton Woods, New Hampshire

Invited

Mossman, B.T., Sonali, H, Taylor, E, Lower, S, Dragon, J, bond, J, Wylie, A, and Shukla,
A (2013) New Data on How Asbestos Fibers Interact with Cells to Trigger Extracellular
Signal-Regulated Protein Kinase, i.e., ERK, Pathways Critical to Toxicity and Disease,
10th International Meeting on fibre/Particle Toxicology, June 407, Dusseldorf, Germany

Wylie, AG and Segrave, A (2019) Can the carcinogenic potential be predicted from
metrological properties. ASTM Beard Conference. Denver April.

f. Published Guides for Field Trips:

Wylie, A. and P. Candela (1987) "The Geology of the Maryland Piedmont". 3-day Trip and Guide Book. Department of Geology Annual Trip, October 1987.

Candela, P. and A. Wylie (1988) "The Ultramafite-associated Cu-Fe-Co-Ni-Zn Deposits of the Sykesville District, Maryland Piedmont". Goldschmidt Conference Field Trip, May, 1988.

Candela, P. and Wylie, A. (1989) "Fe-Cu-Co-Ni-Zn deposits of Sykesville, Md." International Geological Congress, T241 July 1989. John Wiley and sons

Candela, P. and A. Wylie (1990) "The Ultramafite-associated Cu-Fe-Co-Ni-Zn Deposits of the Sykesville District, Maryland Piedmont". Goldschmidt Conference Field Trip, May, 1990.

Wylie, AG. (2018) Geology of the Catoclin Mountains, MD. June 9, 2018. Geological Society of Washington Spring Field Trip.

g. Contracts and Grants

Principal Investigator, "Mineralogical Analysis of Road Aggregate Used in Maryland", Maryland Highway Administration, \$8,089. November 1974-July 1975.

Co-Principal Investigator, "Optical Microscopic Electron Optical and Microprobe Characterization of Asbestos-Related Materials", U.S. Bureau of Mines, \$16,645. December 1975-November 1976.

Principal Investigator, "Serpentines", Faculty Research Board, University of Maryland, \$750. Summer 1976.

Principal Investigator, "Optical Microscopic and Electron Optical Characterization of Asbestos-Related Materials", U.S. Bureau of Mines, \$11,188. December 1976-November 1977.

Principal Investigator, "Characterization of Asbestos-Related Materials Including Particle Size Distribution, Aspect Ratio and Orientation", U.S. Bureau of Mines, \$21,437. December 1977-November 1978.

Principal Investigator, "Mineralogical and Size Distribution Studies of Amphibole Asbestos", U.S. Bureau of Mines, \$84,200. April 1979-April 1981.

Principal Investigator, "Dispersion Staining in Optical Mineralogy", Undergraduate Fund for Improvement of Instruction, University of Maryland, \$700. 1982.

Principal Investigator, "Quality Control in the Analysis of Asbestos by PLM", \$10,000. Sept. 1985-Sept. 1986. Occupational Medical Center.

Principal Investigator "Mineralogy of the Sand Fraction of Aquifer in Northwestern Washington". United States Geological Survey, \$2,450. June-October 1986.

Univ. of Maryland General Research Board Semester Research Award, \$1,500. 1987.

Mineralogy of Waste Product of Sand and Gravel Processing". Aggregate Industries, \$12,000. 1987-1988.

Characterization and Quantification of Fibrous Tremolite in Tremolitic Talc. Southern Talc Company, \$17,000. 1989-1990.

Principal Investigator, "Mineralogical Characteristics of Fibrous Talc". R.T. Vanderbilt Company, \$23,500. September 1992-December 1997.

Project Director, "Fellowship for the Study of Industrial Talc". R.T. Vanderbilt Company, \$33,500. January 1, 1993-December 31, 1997.

Co-Project Director,(with C Schwartz) "Research and Laboratory Testing of Chromium Processing Waste at Dundalk Marine Terminal", Maryland Department of Transportation, \$100,000. December 1996-December 1997.

Co-Project Director (with K Prestegaard and A Amde) "Characterization of Coal Combustion Products and Derived Grout Materials," Nuclear Power Plant Research Program, Maryland Department of the Environment, \$10,000, 1998.

Co-Project Director (with K Prestegaard and A Amde) "Characterization of Coal Combustion Products and Derived Grout Materials, Nuclear Power Plant Research Program, Maryland Department of the Environment, \$60,000, 1999

Co-Project Director, (with K Prestegaard and A Amde)"Characterization of Coal-Combustion Products and Derived Grout Material". Power Plant Research Program, Maryland Department of Natural Resources, \$40,000, 2000.

Co-Project Director, (with K Prestegaard and A Amde)"Characterization of Coal-Combustion products and Derived Grout Material (supplement) Power Plant Research Program, Maryland Department of Natural Resources, \$60,000, 2000.

Co-Project Director, (with K Prestegaard and A Amde) "A study of the Mineralogical Transformations in Fly-Ash Based Grouts. Maryland Department of Natural Resources, Power Plant Research Program, \$30,000, 2000-2001

Co-Project Director (with P Candela) "A study of the thermal transformation of chrysotile", Ford, GM and Chrysler, \$610,000, 2004-2006

h. Fellowship, Prizes and Awards

Seven College Conference of Women's Colleges Scholarship to Wellesley College, 1962-1966.

Wellesley College Scholar, 1966.
Wellesley College B.A., *cum laude*

Faculty Fellowship, Columbia University, 1969-70, 1971-72.

Citation from Governor, State of Maryland, for recognition of assistance in implementation of Title IX in Maryland, 1983.

Butler Prize, Geological Society of Washington, 1989. Given for the best paper read before the Society, 1989.

Distinguished Scholar-Teacher 1994 UMCP.

Fellow Geological Society of America 1990

Honorary Membership in Zeta Nu chapter of Eta Sigma Phi 2011

Outstanding Woman of the Year, President's Commission on Women's Issues, 2012

President's Medal, University of Maryland, 2014

3. Teaching, Mentoring, and Advising

a. Courses taught

Course

Approximate Average Enrollment

Physical Geology	150
Economic Geology	10
Optical Mineralogy	6-10
Ore Microscopy	3
Senior Thesis Research	10
Advanced Topics in Economic Geology	14
Geology of Maryland	6
Geology and Public Policy	15
Environmental Geology	60

b. Advising: Research Direction

i. *Undergraduate Thesis (beginning 1980) Major Advisor:*

1980 ¹Ed. Jacobsen "Coal Geology of Garrett County, Maryland"

¹Winner of the AAPG National Undergraduate Research Award

- 1982** Sharron O'Donnell "Coal Geology of Southwestern Kentucky
Eric Windsor "Shape Characterization of Amphiboles"
Morris Levin "Characterization of Part of the Sykesville Magnetite District by a
Magnetometer"
Lyle Griffith "The Use of a Magnetometer in Characterizing the Beasman
Prospect, Sykesville, MD."
²John Varndell "Heavy Element and Particle Size Relationships in a Sludge
Disposal Site, Baltimore, Maryland"
Joe Segretti "Relationship between cytotoxicity and coating of chrysotile fibers"
Mark Beal, A Geologic Evaluation of a Placer Gold Deposit in Southern
Fauquier Co., Virginia
- 1983** Keith Mason "A Preliminary Evaluation of Copper and Cobalt in Conjunction
with Iron Mining in the Beasman Prospect of Sykesville, Md."
Michael D. Jones "Chromium in the Soils and Streambeds above the Hunting
Hill Serpentine Body, Montgomery County, Md."
Theresa Baker "Crack Growth in Quartz: The Effects of Chemical
Environments"
Mark Hevey "Gas Production and Faulting in Gas Field, Kansas"
- 1984** Brian Hart "A Potential Field Study of the Magnetite Bearing Deposits of the
Central Portion of the Sykesville Mining District"
Katherine Heller "A Reconnaissance Study of the Origin of Small Talc and
Serpentine Bodies in the Wissahickon Formation within the Maryland
Piedmont"
- 1987** Dan Linder "Comparison of the James Run with the Sykesville and Morgan Run
Formation"
Bethany Baker "Observation on the Geology of Montgomery County from
geomagnetic, aeroradioactivity and gravity surveys"
Valerie Gray "Reconnaissance Study on the Source of Gamma Radiation
Fluctuation in Eastern Montgomery County"
- 1988** Tom Davis "Comparative Geothermometry by Using Garnet-Biotite and Fe-Ti
Oxides in the Loch Raven Schist
- 1991** Dan Galasso "Geochemical Prospecting of Heavy Minerals to Determine if a
Marker Exists for the Sykesville District of Carroll County, MD"
- 1994** David Berry "Analysis of Trace Quantities of Amphibole Asbestos Based on the
Fractal Model for Mass Distribution"
- 1995** Bob Schultz "Determination of Asbestos in a Matrix Through Employment of the
Fractal Model for Mass Distribution"
Allan Jackson-Gewirtz "A Comparison of Methods of Analysis of Powdered

²2nd Place Winner of the AAPG National Undergraduate Research Award

Samples"

Roberta Winters "Biological Effect of Fiber Size and Mineralogy: The Case of Talc Fibers in Hamster Tracheal Epithelial (HTE) and Rat Macrophage Cells (RMC)"

Mi Lim "Anomalous Optical Properties of Tremolite-Actinolite Fibers"

- 1996** Tom Biolsi "Effects of absorption and thickness in measuring the index of refraction of blue glass and riebeckite and its application to crocidolite"
Katherine White "X-ray diffraction and optical analysis of picrolite from the State Line Quarry, PA"
Christine Rosenfeld, "Characterization of the Chemistry of the Zeolites Erionite and Mordenite as a Function of Morphology: An SEM/EDS study"
- 1997** Matt McMillan "Lattice dimensions vs. chemical composition and optical properties of tremolite"
- 1999** Russell Meyer "Lattice Dimensions, chemical composition and optical properties of crocidolite"

ii. Master of Science Degree Awarded

- 1985** John Ossi, M.S., "A New Petrographic Method For Interpreting Coal-Forming Environments of Deposition"
- 1988** Robert Virta, M.S., "An Evaluation of the Adequacy of Morphological Data for Determining the Carcinogenicity of Minerals"
- 1990** Dan Linder, M.S., "The Mineralogy and Origin of the State Line Talc Deposit, Lancaster Co., Pennsylvania"
- 1991** Tim Rose, M.S., "Petrology and Chemical Variation of Peraluminous Granitic Rocks from the Northern Lobe of the Phillips Pluton, Maine"
- 1996** Jiang Feng, M.S., "Evidence for compositional variation in phyllite from Carroll and Frederick Counties, MD"
- 1988** William Greenwood, M.S. "Mineralogical Characteristics of Fibrous Talc"

Diane Hanley, M.S., "Overland flow evaluation of lava flow platform"
- 1999** Mark Watson, M.S., "Effects of intergrowths on the Physical Characteristics of fibrous Anthophyllite"
- 2001** Amina DeHarde, M.S., "Characterization of Grouts made from Coal Combustion By-Products: Mineralogy and Physical Properties"
- 2005** Courtney Crummett, M.S. (co-chair) "Examination of the Thermal decomposition of Chrysotile"

iii. Ph.D.

- 1991** James Crowley, Ph.D., "Geochemical Study of Playa Efflorescent Salt Crusts and Associated Brines by Using Spectral Reflectance, X-ray Diffraction and Brine Chemical Data"
- 1999** Martitia Tuttle, Ph.D., "Late Holocene Earthquakes and their Implications for Earthquake Potential of the New Madrid Seismic Zone, Central United States"

4. SERVICE

a. Professional

i. *Offices and Committee Membership Held in Professional Organizations*

Geological Society of America (Fellow)
 Mineralogical Association of Canada
 Geological Society of Washington
 American Association for the Advancement of Science
 American Geophysical Union
 Geological Society of America Campus representative (1985-2000)
 Chairman, Sigma Xi Graduate Student Research Award Selection Committee, UMCP
 (1986, 1987)
 Mineralogical Society of America: Tellers committee, 1989-1991.
 Representative to American Geological Institute, K-12 Education Committee, 1991
 Field Trip Chairman, Geological Society of Washington, 1990.
 Delegate to AAPG - Geological Society of Washington 1995-96.

ii. *Reviewing Activities for Journals and Agencies*

<i>American Mineralogist</i>	Environmental Protection Agency
<i>Canadian Mineralogist</i>	U.S. Geological Survey
<i>Science</i>	<i>Economic Geology</i>
<i>Environmental Research</i>	Society of Mining Engineers
U.S. Bureau of Mines	<i>American Industrial Hygiene Journal</i>
<i>European Journal of Mineralogy</i>	<i>Critical Reviews in Toxicology</i>
<i>Periodico di Mineralogia</i>	<i>Scientific Reports</i>
National Institute for Occupational Safety and Health	

iii. *Other Professional Activities*

Co-Chairman, New York Academy of Sciences, Workshop #1. Significance of Aspect Ratio in Regulation of Asbestos Fiber Exposure, Conference on the Scientific Basis for the Public Control of Environmental Health Hazards, New York (1978).
 Invited Chairman and Organizer of "Asbestiform Minerals Symposium", AIME Annual Meeting (1979) Tucson, Arizona.
 Appointed by the U.S. Secretary of Education to the Task Force on Asbestos in the Schools (1980-1984).
 Session Chairman, EPA Conference on Monitoring and Evaluation of Airborne Asbestos Levels Following Abatement, March, 1984.
 Appointed reference analyst for U.S. Navy Asbestos Analysis Quality Assurance Program (administered by Research Triangle Institute) 1984-1990.
 Session Chairman, Economic Geology III, Geol. Soc. of Amer. National Meeting, November 1985.
 Member, ASTM Task Group for writing Standard Methods of Analyses of Asbestos by TEM, SEM, Phase Contrast Optical Microscopy and Polarized Light Microscopy. 1985-1990. Author of Polarized Light Microscopy Method (grey sheets).

Expert witness, Occupational Safety and Health Administration hearing on asbestos regulation, 1985, 1990.
 Invited participant, Penn. Geol. Survey Conference on Mapping in the Piedmont, 1987.
 Expert panel member, EPA, Superfund Bulk Asbestos Method, 1990-1991.
 Member IARC Work Group for Talc, Carbon Black, and Titanium Dioxide, Lyon France 2006.
 Wellesley College, Class of 1966 Class Officer 1981-86, 2006-11; Annual giving committee 2012-2016
 Member, Peer Review Panel, NIOSH, Roadmap for Scientific Research on Asbestos and Other Mineral Fibers, 2007
 Testimony, US House Senate, Committee on Environment and Public Work June 12, 2007 and follow-up letter, June 16, 2007
 Member, Scientific Advisory Board, National Stone, Sand and Gravel Association 2011-present
 Member, Frederick Regional Higher Education Advisory Board 2013-2015
 Member, Frederick Center for Research and Education in Science and Technology (CREST) Governing Board 2015-2018
 Member Planning Committee for NIOSH EMP workshop on Terminology and Characterization, Paul Middendorf Chair 2016 (rescheduled by CDC to 2017).
 Invited participant and member of the Planning Committee, National Academies Workshop on elongated Mineral Particles, May 15-16 2017. (rescheduled to January 2018: cancelled by NIOSH in January)
 Co-chair NSSGS/Society of Toxicology Monticello Conference on EMPS, October 2017, Charlottesville, VA
 Guest editor. Special issue of Toxicology and Applied Pharmacology: The Monticello Conference.
 Invited speaker and session co-moderator, JIFSAN workshop. Asbestos in talc. Nov 2018

c. Selected University of Maryland Service

Chairman, Institutional Review Board (IRB) 1984-1986
 Supervisory responsibility for Animal Care and Use Committee and actions (1984-1986)
 Chair, General Research Board 1984-1986
 Chair, Creative and Performing Arts Board 1984-1986
 Member Review Committee for Dean of the College of Computer Mathematical and Physical Sciences 1990
 Member, Review Committee for Chair of Department of Economics 1998
 Chair, Earth System Science Director Search Committee 1998
 Chair, Limited Enrollment Committee, 2000-2002
 Chair, Campus Assessment Working Group, 2000-2002
 Chair, Search Committee, Vice President for Research 2002
 Chair, Search Committee, Vice President for Administration and Finance, 2004
 Chair, UMCP Graduate Council, 2004-2006
 UMCP Strategic Planning Steering Committee, Graduate Education Chair, 2008
 Chair, UMCP Finance Committee, 2008-2011
 Chair, UMCP Sustainability Council 2009-2011
 Chair, Student Fee Review Committee 2008-2011
 Chair, UMCP Facilities Council, 2011-2012

MPowering the State, UMB-UMCP Steering committee 2011-2013

Carey School of Law Dean Search committee 2013-2014

Facilitator, Leadership Fellows Program, UMCP Advance. 2013-2014

College of Computer, Mathematical and Natural Sciences, University of Maryland, Board
of Visitors, 2013-2018

Member. UM Investigation Committee for scholarly misconduct case. 2015

Chair, Investigation Committee to review UM Maryland Industrial Partnership grant to
Fifth Quarter Fresh and School of Public Health. 2016

EXHIBIT B

Previous Four Years of Expert Testimony for Ann Wylie, Ph.D.

Dr. Ann Wylie has not testified as an expert at trial or by deposition during the previous four years.

Exhibit I

**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF NEW JERSEY**


**IN RE: JOHNSON & JOHNSON TALCUM
POWDER PRODUCTS MARKETING, SALES
PRACTICES AND PRODUCTS LIABILITY
LITIGATION**

MDL NO. 16-2738 (FLW) (LHG)

THIS DOCUMENT RELATES TO ALL CASES

**EXPERT REPORT OF M. DARBY DYAR, PHD
FOR GENERAL CAUSATION *DAUBERT* HEARING**

Date: February 25, 2019



M. Darby Dyar, Ph.D.

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I. EXECUTIVE SUMMARY

To confirm the presence of asbestos in talcum powder, there are three questions to consider:

1. **Mineralogy:** Are the mineral species present among those that include asbestos?
2. **Physical properties (habit):** Do the minerals have an “asbestiform” habit, occurring as particles that are lengthwise separable into flexible fibers?
3. **Concentration:** What are the abundances of the minerals?

The expert reports dated November 14, 2018, January 15, 2019 and February 2, 2019 from plaintiffs’ experts William E. Longo and Mark W. Rigler (the “Longo/Rigler MDL Reports”) fail to demonstrate that **any** of these three requirements is true of the impurities allegedly occurring in the tested talcum powder. Instead, they (or more specifically, their five analysts) applied a methodology that was inherently designed to achieve the results they desired for purposes of this litigation.

As an initial matter, many minerals have very similar chemical formulas, and many minerals occur with fibrous shapes, but not all of these minerals are “asbestos.” Asbestos minerals have both a specific chemical composition and a unique ‘habit’ or morphology. Asbestos is defined as one of six particular minerals exhibiting the characteristics of an asbestiform habit, meaning they can be separated into flexible fibers with high tensile strength. Drs. Longo and Rigler confuse “counting criteria” with this definition, using a disingenuous distinction between what they call the “geological definition” and what they wrongly invent as the “regulatory definition.” This is not scientifically proper.

- **EDS (mineral chemistry).** Drs. Longo and Rigler opine on tests run by their analysts using Energy Dispersive Spectroscopy (“EDS”) to identify the chemistry of certain particles that they have isolated in the samples tested. EDS, properly used, can somewhat measure the chemistry of a mineral, or at least narrow down the possible chemistries, even if it cannot tell a scientist whether that mineral’s shape is asbestiform or not. But the analysts do not follow generally accepted scientific methodology in their EDS analysis. For example:
 - They “eyeball” the EDS spectra and rely only on the images generated by an EDS analysis to evaluate the chemical composition of each mineral.
 - They visually compare their spectra to “reference standards” apparently belonging to their lab only, which standards are not in the published literature, which likely represent only asbestiform minerals and which Drs. Longo and Rigler did not produce (such that it cannot be determined if these standards have any scientific validity whatsoever).
 - In doing so, they deliberately choose not to generate **quantitative numbers** that would more accurately determine chemical compositions, which is the very purpose of an EDS analysis of an unknown mineral. The quantitative data is necessary to make scientifically valid conclusions, and their conclusions are therefore unsupportable.

As a result, Drs. Longo and Rigler and their analysts used a flawed methodology that resulted in wildly inconsistent results across different analysts and over time. In science, proof involves demonstrating that a result is replicable. Consequently, the particles that they identify as “anthophyllite” may actually be talc, cummingtonite or other minerals. The particles that they identify as “tremolite” could be other amphiboles¹, diopside (pyroxene) or other minerals.

Finally, confirming the lack of reproducibility in their methodologies, I have analyzed the EDS interpretations of each of the five separate analysts used by Drs. Longo and Rigler. Although there should be parallel results across analysts, there is clear evidence of personal biases, which is unsurprising given the unscientific and subjective nature of the methodologies employed.

- **SAED (crystal structure).** Drs. Longo and Rigler opine on tests run by their analysts using selected area electron diffraction (SAED) to identify the crystal structure of selected particles in the samples tested. Again, they do not follow generally accepted scientific methodology in their SAED analysis. For example:
 - A majority of the patterns they generate are of poor quality, making them impractical or impossible to interpret.
 - For an accurate identification of an unknown mineral, at least two (and preferably more) SAED patterns must be taken with the sample oriented along a “zone axis.”² Yet for those minerals identified as “tremolite,” they use only one SAED pattern, resulting in inconclusive data that would be consistent with many other minerals, including those that have no asbestiform habit. Similarly, for those minerals that they identify as “anthophyllite,” the analysts took two SAED patterns for only two samples, and these are insufficient to uniquely identify anthophyllite.
 - A fundamental part of analyzing SAED results is to calculate the “*d*-spacings” between layers of atoms, which may be diagnostic of each mineral species. It appears that Drs. Longo and Rigler and their analysts did not initially use *d*-spacings at all, once again adopting qualitative “eyeball” methodologies found nowhere in the literature over quantitative, accepted science. **After** generating their first report, they used a small number of *d*-spacing measurements to “verify” their prior conclusions. Yet those “verifications” show *d*-spacings that are consistent with **25% of all common rock-forming minerals**. Even Drs. Longo and Rigler concede they do not uniquely identify any one mineral.
 - Some of the Longo/Rigler *d*-spacing interpretations even have impossible values, demonstrating significant flaws in the methodology used.

¹ Amphibole is the group name of a group of hydrous silicate minerals that include, among other individual minerals, tremolite, actinolite and anthophyllite.

² The zone axis is the direct crystal axis that is parallel to the electron beam at the orientation when the SAED pattern is recorded

- The EPA “Yamate III” protocol for analyzing talc for impurities – which Drs. Longo and Rigler say they followed – requires two SAED zone axis determinations. Yet, of the more than 70 bottles tested, Drs. Longo and Rigler only did this for **two** bottles.

As a result, what Drs. Longo and Rigler identify as anthophyllite or tremolite in the samples analyzed may actually be hundreds of other possible minerals or individual crystal structures.

- **TEM visual inspection.** The analysts in the Longo/Rigler MDL Reports purport to find the concentration of “asbestos” using visual inspection techniques under TEM. They do not, however, follow generally accepted scientific methodology in this analysis. For example:
 - Use of TEM images to **visually** distinguish non-asbestiform amphiboles and asbestiform amphiboles is scientifically invalid, as stated by the very protocols upon which Drs. Longo and Rigler rely.
 - Indeed, Drs. Longo and Rigler and their analysts did not apply objective criteria for distinguishing between cleavage fragments, bundles and fibers, as demonstrated by the inconsistent results of their analysts.
 - Moreover, the results reported in the Longo/Rigler MDL Reports are inconsistent from analyst to analyst, highlighting the unreliability of their method of visual identification using TEM.
 - The analysts used by Drs. Longo and Rigler utilized the concept of “aspect ratio” – the ratio of a particle’s length to width – and counted all particles greater than 0.5 μm in length that have substantially parallel sides and an aspect ratio greater than 5:1. Yet, as Drs. Longo and Rigler admit, a particle that is non-asbestiform **can also have an aspect ratio greater** than 5:1. This means that the Longo/Rigler MDL Reports do not distinguish asbestiform minerals from non-asbestiform minerals (e.g., “cleavage fragments”) in this regard.
 - This is scientifically invalid because, based on peer-reviewed studies, it is known that size distributions for non-asbestiform particles are different than those for asbestiform particles. Using statistical methods – methods not used by Drs. Longo and Rigler – asbestiform and non-asbestiform populations can readily be distinguished. **However, Drs. Longo and Rigler deliberately did not compile data in the low aspect ratio range, making a valid particle analysis impossible.**
 - To the extent analysis is possible of the aspect ratio size population they did measure, statistical tests of aspect ratio populations establish that the particles measured by the analysts used by Drs. Longo and Rigler belong to the population represented by **non-asbestiform tremolite**.
- **PLM (mineral identification).** The analysts used polarizing light microscope (PLM) images to identify the nature of any asbestos in the tested samples and the concentration. They did not, however, follow generally accepted scientific methodology in their PLM analysis. For example:

- The analysts purported to follow the methodology found in a peer-reviewed article by Su (2003). But Su sets forth a particular methodology to do dispersion staining, an absolutely critical step of the analysis, which was not followed.
- Otherwise, the PLM images from the Longo/Rigler MDL Reports are in many cases ambiguous because talc and amphiboles have overlapping and similar optical properties, and they can easily be confused for each other.
- The analysts doing the PLM work purported to use two methodologies to determine concentration of asbestos contaminants – “ISO” PLM and “Blount” PLM – which should have consistent results. All tests using the former were either negative or under 0.1% by weight percentage (consistent with the absence of asbestos). Ten of the tests using the latter were positive at concentrations up to seven times the results of the former, which indicates a complete lack of reliability and reproducibility in this PLM testing.
- Dr. Longo and Rigler’s “concentration” analysis did not use “point counting,” which is the standard method to estimate concentration of phases by PLM. Rather, Drs. Longo and Rigler’s analysts used, once again, visual reference charts that appear to be unique to their lab, are not in the peer-reviewed literature, and are not produced (such that it cannot be determined if these standards have any scientific validity whatsoever).

In summary, the results in the Longo/Rigler MDL Reports are the product of fundamentally flawed methodologies and are **not the result of work done according to generally accepted scientific standards and methodologies**. Despite producing lengthy, descriptive reports and undertaking extensive measurements according to government protocols, Drs. Longo and Rigler did not properly train their personnel for the task of characterizing impurities in talc, where the possible mineralogy is unconstrained. Thus, they lack the background to understand or interpret their results, especially where, as here, the impurities are tiny, and many possible minerals can be present.

The Longo/Rigler MDL Reports simply fail to demonstrate that any asbestos minerals are present in the material Drs. Longo and Rigler tested in any concentration with any asbestiform shapes.³ Indeed, every methodological error in their testing results in false positive findings of asbestos, but not false negatives. Given that Drs. Longo and Rigler’s testing can only be described as a series of errors, each of which acts to amplify the errors preceding it, the results of Drs. Longo and Rigler’s testing cannot be considered scientifically valid.

All opinions in this report are stated to a reasonable degree of scientific certainty, and the methods used are among those that I employ in my professional work as a mineralogist.

³ IARC (2012) defines the minerals that can be asbestos as follows: “the generic commercial designation for a group of naturally occurring mineral silicate fibres of the serpentine and amphibole series. These include the serpentine mineral chrysotile [], and the five amphibole minerals – actinolite, amosite [], anthophyllite, crocidolite [], and tremolite.” International Agency for Research on Cancer (2012), *Monographs on the Evaluation of Carcinogenic Risks to Humans Vol. 100C: Asbestos (Chrysotile, Amosite, Crocidolite, Tremolite, Actinolite and Anthophyllite)*, 219.

II. BACKGROUND AND QUALIFICATION

I studied geology at Wellesley College, where my thesis involved field work to create a geologic map of the nearby Broadmoor Wildlife Sanctuary. I received my Ph.D. from the Massachusetts Institute of Technology in geochemistry and mineralogy. My Ph.D. thesis, entitled “Crystal chemistry and statistical analysis of iron in mineral standards, micas, and glasses,” focused on minerals from a cross-section of geological problems. I was next a member of the Research Faculty at the California Institute of Technology, before holding faculty positions in the Department of Geological Sciences at the University of Oregon, Department of Geology and Astronomy at West Chester University, and most recently, at Mount Holyoke College, where I began in the Department of Geology and Geography before moving to chair the Department of Astronomy. I now hold an endowed chair as Kennedy-Schelkunoff Professor of Astronomy. I am also a member of the graduate faculty at the University of Massachusetts in Amherst, and a Senior Scientist at the Planetary Science Institute.

Over the course of my years in academia, I have taught mineralogy at least 20 times, including as a teaching assistant at MIT and at all three academic institutions where I have been a faculty member. I have supported public outreach related to mineralogy through the creation of two software programs used in many US states for teaching mineralogy to K-12 students. They include *The Study of Minerals* (1997) and *Hands-On Mineral Identification* (1999). I have also authored two textbooks: *Mineralogy and Optical Mineralogy: A Three-Dimensional Approach* with Mickey E. Gunter (first published in 2008, now in its 2nd edition and also available as an iBook) and *Geostatistics Explained, An Introductory Guide for Earth Scientists* with Steven McKillip (2010).

My research has resulted in more than 250 papers published in peer-reviewed journals, and it spans a number of different topics in mineralogy. Areas of interest have included metamorphic rocks from western Maine, tourmaline mineralogy from worldwide occurrences, mineralogy of rocks (xenoliths) from 90 km below Earth’s surface (brought up by volcanoes), and many other rock types. The study of amphibole minerals has been a constant theme throughout my career, starting with a chapter in my thesis, extending to studies of its chemical variation that continue to this day.⁴ I have also published several papers relating to the mineralogy of asbestiform minerals, including papers on serpentine and amphibole asbestiform minerals.⁵

⁴ See Dyar (1984) *American Mineralogist*, **69**, 1127-1144; Dyar et al. (1996), in Dyar et al., EDXA, *Mineral Spectroscopy: A Tribute to Roger G. Burns*, Special Publication #5, Geochemical Society, 273-289. Delaney et al. (1996), in Dyar et al., EDXA, *Mineral Spectroscopy: A Tribute to Roger G. Burns*, Special Publication #5, Geochemical Society, 170-177; King et al. (2000) *Earth and Planetary Science Letters*, **178**, 97-112. Gunter et al. (2003) *American Mineralogist*, **88**, 1944-1952; Minitti et al. (2008) *Earth and Planetary Science Letters*, **266**, 46-60; Minitti et al. (2008) *Earth and Planetary Science Letters*, **266**, 288-302; Sanchez et al. (2008) *European Journal of Mineralogy*, **20**, 1043-1053; Lupulescu et al. (2009) *Canadian Mineralogist*, **47**, 909-916; McCanta et al. (2009) *Geochimica et Cosmochimica Acta*, **72**, 5757-5780; Gunter et al. (2011) *American Mineralogist*, **96**, 1414-1417; Dyar et al. (2016) *American Mineralogist*, **101**, 1171-1189; Chan et al. (2016) *Canadian Mineralogist*, **54**, 337-351; Mueller et al. (2017) *European Journal of Mineralogy*, **29**, 167-180; Di Guiseppe et al. (submitted) *Toxicology and Applied Pharmacology*.

⁵ O’Hanley and Dyar (1993) *American Mineralogist*, **78**, 391-404; O’Hanley and Dyar (1998) *Canadian Mineralogist*, **36**, 727-739; Gunter et al. (2003) *American Mineralogist*, **88**, 1944-1952; Gunter et al. (2011) *American*

The unifying theme of my research is developing and using analytical techniques to solve geological problems, most of which involve identifying and quantifying minerals in mixtures. NASA is especially interested in this problem because many techniques that are used on planetary surfaces and in orbits involve acquiring signatures of rocks and then extracting individual mineralogy from those mixed signals. For example, in my work as a Participating Scientist on the science team for the Mars Exploration Rover *Curiosity*, we studied the problem of identifying individual minerals based on rock measurements.⁶ I studied meteorites from Mars and examined the spectra signatures of individual minerals and also the rock from which they were separated.⁷ We sometimes even create “fake rocks” from mineral mixtures and then make measurements of the mixtures to try to understand how to determine abundances of those minerals.⁸ My research depends heavily on the use of robust statistical analyses, and I often utilize machine learning techniques to solve problems in an unambiguous way.⁹

I work hard to uphold the standards of my profession by reviewing research proposals and journal publications continuously. I have been an Associate Editor for the *American Mineralogist* since 2000, handling up to 30 papers each year. I have edited one book for the Geochemical Society and one special volume of the *American Mineralogist*. I personally review at least a dozen manuscripts for a wide variety of journals every year, as well as many research proposals. I serve on review panels for the National Science Foundation and NASA almost every year, in which capacity I sometimes review as many as 18 proposals per year. As such, I am an experienced reviewer of scientific reports.

My research has been recognized with both national and international awards. I am a Fellow of the Mineralogical Society of America, the Geochemical Society and the Geological Society of America (GSA). I received the 2017 G. K. Gilbert award from the GSA for my outstanding contributions to planetary science and the 2018 Eugene Shoemaker Distinguished Scientist medal from NASA for “a scientist who has significantly contributed to the field of lunar and/or asteroid science throughout the course of their scientific career.” I received the Hawley Medal from the Mineralogical Association of Canada in 2017, and currently hold the position of Helmholtz International Fellow with the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt).

A copy of my current curriculum vitae is attached hereto as Exhibit A. My hourly rate for this work has been \$500 per hour.

Mineralogist, **96**, 1414-1417; Evans et al. (2012) *American Mineralogist*, **97**, 184-196; Swayze et al. (2018) *American Mineralogist*, **103**, 517-549; Di Guiseppe et al. (submitted) *Toxicology and Applied Pharmacology*.

⁶ Dyar et al. (2013) *Geological Society of American Annual Meeting*, Denver, Abstract #6-5; Dyar et al. (2014). *Lunar Planet. Sci.* **XLV**, Lunar Planet. Inst., Houston, CD-ROM #1788 (abstr.).

⁷ Dyar (2002) *LPI Conf.*, Houston, #6011; Dyar (2003) *Meteoritics and Planetary Science*, **38**, 1733-1752.

⁸ Carey et al. (2016) *Lunar Planet. Sci.* **XLVII**, Lunar Planet. Inst., Houston, (abstr.) #2626.

⁹ Boucher et al. (2015) *Journal of Chemometrics*, doi: 10.1002/cem.2727; Dyar et al. (2016) *Spectrochimica Acta B.*, **126**, 53-64; Boucher et al. (2015) *Spectrochimica Acta B.*, **107**, 1-10; Carey et al. (2015) *Journal of Raman Spectroscopy*, **46**, 894-903; Boucher et al. (2017) *Journal of Chemometrics*, **31**, e2877; and Giguere et al. (2017) *Applied. Spectroscopy*, **71**, 1457-1470.

III. BACKGROUND: WHAT IS AN ASBESTIFORM MINERAL?

The definition of asbestos involves three different characteristics of a particle: **chemical composition, crystal structure and physical properties.**

By way of overview, the asbestiform nature of asbestos minerals is seen in **Figure 1**, which shows photomicrographs of tremolite and anthophyllite – two of the amphibole minerals that will form the basis for much discussion in this report.

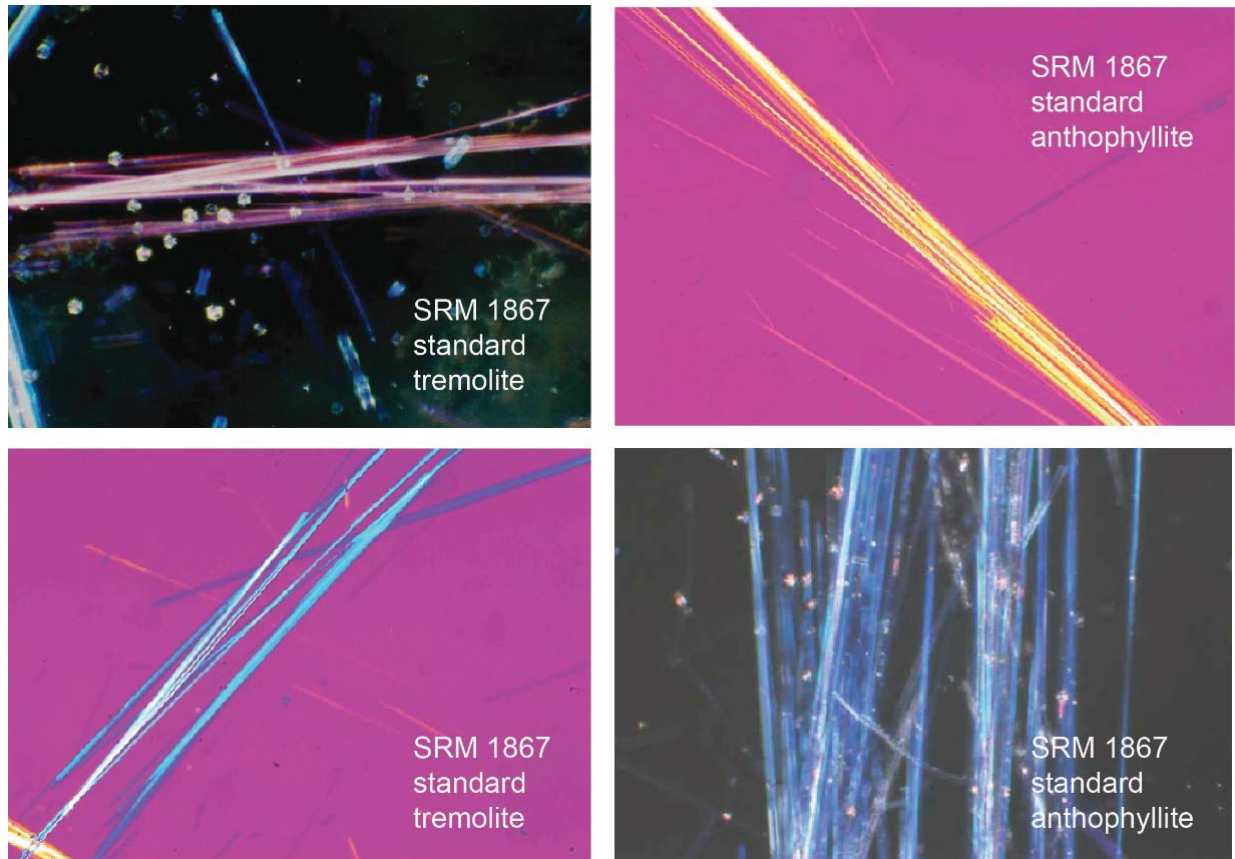


Figure 1. Microscopic images of tremolite (left) and anthophyllite (right) asbestos reference standards from the U.S. National Institute of Standards and Technology. All of these particles meet the standard definition of “asbestiform” articulated in Gunter (2010) and can “be separated lengthwise into fibers.” Images from ISO 22262-1, Figures D.23, D.25, D.32, and D.34.

Each of these minerals has a specific chemical composition, crystal structure and physical properties. This is what makes them asbestos.

Thus, this Introduction explains the criteria relevant to the study of potentially asbestiform minerals in talcum powder. There are three issues to consider:

1. **Mineralogy:** Are the mineral species among those that include asbestos?
2. **Physical properties (habit):** Do the minerals have an ‘asbestiform’ habit – in other words, is this the asbestiform version of a mineral and not the non-asbestiform version?
3. **Concentration:** What are the abundances of the minerals?

A. Mineral Species Identification

Summary: Many minerals have very similar chemical formulas, and many minerals occur with fibrous shapes, but “asbestos” minerals have *both* a specific chemical composition and a unique ‘habit’ or morphology.

The strict definition of a mineral species is that it (1) occurs in nature, (2) is stable at room temperature, (3) is generally produced by inorganic processes, (4) can be represented by a **chemical formula**, and (5) has a **specific, ordered arrangement of atoms**. The last two of these are especially important to this report.

Mineralogists use very specific mineral species names, regulated by an international committee, to assure that minerals with the same name have all five of these characteristics in common. There are currently ~5,500 known mineral species, and many more are found every year.¹⁰ Mineral classification is hierarchical, like biological classifications. Instead of the familiar “kingdom, phylum...genus, species” used in biology, mineralogists use mineral class, type, group and species. Species names are unique and highly specific. While there are **only six regulated asbestiform mineral species**, shown in red in **Table 1**, there are many other minerals related to them.

[**Table 1** on next page.]

¹⁰ Mineral species names and compositions are certified by the Commission on New Minerals and Mineral Names (CNMMN) of the International Mineralogical Association.

Table 1. Minerals Similar to Talc that Contain Si, Mg, Fe, Ca, Na, H and O*

Mineral Species	Mineral Class	Chemical Formula	(Mg,Fe) : Si
Anthophyllite	Amphibole	Mg₇Si₈O₂₂(OH)₂	7 : 8
Antigorite	Serpentine	Mg ₃ Si ₂ O ₅ (OH) ₄	3 : 2
Chesterite	inosilicate >1 chain	Mg ₁₇ Si ₂₀ O ₅₄ (OH) ₆	17 : 20
Chrysotile	Serpentine	Mg₃Si₂O₅(OH)₄	3 : 2
Clinohumite	Nesosilicate	(Mg,Fe) ₉ (SiO ₄) ₄ (OH) ₂	9 : 16
(clino)jimthompsonite	inosilicate >1 chain	Mg ₅ Si ₆ O ₁₆ (OH) ₂	5 : 6
Enstatite	Pyroxene	Mg ₂ Si ₂ O ₆	1 : 1
Grunerite	Amphibole	Fe₇Si₈O₂₂(OH)₂	7 : 8
Hydroxylclinohumite	Nesosilicate	Mg ₉ (SiO ₄) ₄ (OH) ₂	9 : 16
Cumingtonite	Amphibole	Mg ₇ Si ₈ O ₂₂ (OH) ₂	7 : 8
Minnesotaite	sheet silicate	(Fe,Mg) ₃ Si ₄ O ₁₀ (OH) ₂	3 : 4
Sepiolite	modulated layers	Mg ₄ Si ₆ (OH) ₂₆ H ₂ O	4 : 6
Talc	sheet silicate	Mg ₃ Si ₄ O ₁₀ (OH) ₂	3 : 4
Tremolite	Amphibole	Ca₂Mg₅Si₈O₂₂(OH)₂	5 : 8
Actinolite	Amphibole	Ca₂(Mg,Fe)₅Si₈O₂₂(OH)₂	5 : 8
Ferrowinchite	Amphibole	CaNaFe ₄ (Al,Fe)Si ₈ O ₂₂ (OH) ₂	5 : 8
Richterite	Amphibole	Na(CaNa)Mg ₅ Si ₈ O ₂₂ (OH) ₂	5 : 8
Ferrorichterite	Amphibole	Na(CaNa)Fe ₅ Si ₈ O ₂₂ (OH) ₂	5:8
Riebeckite	Amphibole	Na₂Fe²⁺₃Fe³⁺₂Si₈O₂₂(OH)₂	5:8
Magnesioriebeckite	Amphibole	Na ₂ Mg ₃ Fe ³⁺ ₅ Si ₈ O ₂₂ (OH) ₂	5:8
Aegirine-augite	Pyroxene	(Ca,Na)(Mg,Fe,Al,Ti)(Si,Al) ₂ O ₆	1 : 1
Diopside	Pyroxene	CaMgSi ₂ O ₆	1 : 1
Hedenbergite	Pyroxene	CaFeSi ₂ O ₆	1 : 1

Table 1. Formulas from the approved IMA “List of minerals” (<http://nrmima.nrm.se/>). Species names in red are termed “asbestos” when they occur in an asbestiform morphology. Shaded species in gray contain Na or Ca.

As shown above, these minerals all contain Si and cations such as Mg, Fe and Ca. Each has a particular ratio of Si to the other cations (the far-right column), which is important in the context of an energy-dispersive X-ray (EDXA) analysis (discussed below).

The mineral species significant to this report are those that combine the elements silicon (Si), magnesium (Mg), iron (Fe), calcium (Ca) and sodium (Na) along with hydrogen (H) and oxygen (O). Notice that the minerals are grouped in two groups, with Ca- and Na-bearing samples in the bottom half of the table. Many minerals have closely related (in some cases, identical) formulas; yet only those highlighted in red are mineral species that are regulated. Thus, it becomes critically important to discriminate these minerals carefully by chemistry and by crystal structure. Tools for these analyses fall into these two groups: tests of mineral composition (the chemical formula criterion noted above) and tests of determination of crystal structure (atomic arrangement). In addition, a particle must have a fibrous morphology to be considered asbestos.

B. Asbestiform Habit

Summary: Asbestos is defined as one of six particular minerals exhibiting the characteristics of an asbestiform habit, meaning they can be separated into flexible fibers with high tensile strength. Drs. Longo and Rigler confuse “counting criteria” with this definition, using a disingenuous distinction between what they call the “geological definition” and what they wrongly invent as the “regulatory definition.”

Asbestos is a **noun** describing a specific material with a distinctive shape that is **asbestiform (adjective)**, which means the crystal can be separated into flexible fibers with high tensile strength.

IARC (2012) defines the minerals that can be asbestos as follows: “the generic commercial designation for a group of naturally occurring mineral silicate fibres of the serpentine and amphibole series. These include the serpentine mineral chrysotile [], and the five amphibole minerals – actinolite, amosite [], anthophyllite, crocidolite [], and tremolite.” IARC (2012), p. 222, also states: “Asbestos fibres tend to possess good strength properties (e.g. high tensile strength, weak and friction characteristics); flexibility (e.g. the ability to be woven); excellent thermal properties (e.g. heat stability, thermal, electrical and acoustic insulation); absorption capacity; and, resistance to chemical, thermal and biological degradation.” Thus, there is agreement in the scientific community that asbestos exhibits fibrosity, high tensile strength and flexibility. This is repeated over and over again in the published literature, for example:

Zoltai, T., “*Amphibole Asbestos Mineralogy*,” *Reviews in Mineralogy & Geochemistry*, (1981) 9(5): 237-278 (stating “the individual asbestos fibers and acicular cleavage fragments are strikingly different. The fibers are extremely strong and flexible, while the acicular cleavage fragments are weak and brittle.”).

Zoltai, T., “*Amphibole Asbestos Mineralogy*,” *Reviews in Mineralogy & Geochemistry* (1981) 9(5): 237-278, at 272 (concluding that “cleavage fragments of amphibole crystals should yield the opposite strength-diameter effect than that observed in asbestos fibers”).

McCrone, W.C., *The Asbestos Particle Atlas 36* (1980) (describing chrysotile as having “distinctive fine flexible fibrils”).

Gary, M., McAfee, R., and Wolf, C., Eds., (1974) *Glossary of Geology* (“Asbestos is a commercial term applied to a group of silicate minerals that readily separates into long, thin, strong fibers that have sufficient flexibility to be woven, are heat resistant and chemically inert, are electrical insulators, and are therefore suitable for uses ... where incombustible, nonconducting, or chemically resistant material is required.”).

Veblen D.R. and Wylie A. (1993) *Reviews in Mineralogy*, 28, 61-138 (“the asbestiform habit has a number of characteristics that differentiate it from other habits, but the main differences are the fibrillar structure and the fiber flexibility and strength”).

Dyar and Gunter (2008) *Mineralogy and Optical Mineralogy* (“there are several types of minerals than can have asbestiform habits, which are distinguished by their fibrillar structure and the flexibility and strength of the fibers.”

Asbestos Fibers and Other Elongate Mineral Particles: State of the Science and Roadmap for Research, (2011) U.S. Dept. of Health & Human Services, NIOSH, Current Intelligence Bulletin 62 at 6 (stating that “[t]he fibers of all varieties of asbestos are long, thin and usually flexible when separated”), 9 (stating that “[i]t has been suggested that crystals grown in an ‘asbestiform’ habit can be distinguished by certain characteristics, such as parallel or radiating growth of very thin and elongate crystals that are to some degree flexible, the presence of bundles of fibrils, and, for amphiboles, a particular combination of twinning, stacking faults, and defects”), 34 (describing chrysotile fibers as “consist[ing] of aggregates of long, thin, flexible fibrils that resemble scrolls or cylinders”), 36 (stating that “[a]sbestiform amphibole fibers consist of aggregates of long, thin, flexible fibrils that separate along grain boundaries between the fibrils”).

Asbestiform Fibers: Nonoccupational Health Risks, National Research Council (1984) at 33 (stating that asbestos particles that have sufficiently small diameters have great strength and flexibility, and that the tensile strength of commercial quality asbestos fibers is 20 to 50 times greater than that of the non-asbestiform crystals of the same minerals), 38 (noting that the flexibility of asbestos fibers enables them to bend without breaking, which facilitates their passage through the respiratory tract into the deep lung), 41 (explaining that, “Asbestiform fibers, including asbestos fibers, are mineral fibers that are characterized by a specific set of interdependent physical properties, including fiber-like shape, enhanced strength and flexibility, increased durability, strong and defect-free surface structure, and the dependence of these properties on conditions of growth. The fiber properties that have been considered for possible association with deleterious health effects are respirability (i.e., fibers <3 μm diameter), size and aspect ratio, durability, flexibility and tensile strength, chemical composition, surface area, and surface charge.”).

Gunter, M., *Defining Asbestos: Differences between the Built and Natural Environments*, 60 CHIMIA No. 10, 747, 748 (2010) (stating that a mineralogist would require that a fiber would need to exhibit a certain set of physical properties, i.e., be curved and flexible, in order to be classified as asbestos).

This usage is echoed in other documents, such as the methodology standards upon which Drs. Longo and Rigler purport to rely:¹¹

ISO 22262-1, -2, -3: defining asbestiform as a “specific type of mineral fibrosity in which the fibres and fibrils possess high tensile strength and flexibility.” ISO 22262-1 (2012) at 2; ISO 22262-2 (2014) at 8; ISO 22262-3 (2016) at 2.

¹¹ See 40 C.F.R. Ch. I (7-1-03 Edition) (defining asbestiform as “a specific type of mineral fibrosity in which the fibers and fibrils possess high tensile strength and flexibility”); 40 C.F.R. 763.83 (defining asbestos as the “asbestiform varieties of” six minerals).

ISO 13794: defining asbestiform as a “specific type of mineral fibrosity in which the fibres and fibrils possess high tensile strength and flexibility.” ISO 13794 (1999) at 2.

ISO 10312: defining asbestiform as a “specific type of mineral fibrosity in which the fibres and fibrils possess high tensile strength and flexibility.” ISO 10312 (1995) at 2.

AHERA: defining asbestiform as a “specific type of mineral fibrosity in which the fibers and fibrils possess high tensile strength and flexibility.” 40 CFR Ch. 1, Pt. 763 Subpt. E, App. A, 728 (July 1, 2013).

ASTM D5755: defining asbestiform as “a special type of fibrous habit in which the fibers are separable into thinner fibers and ultimately into fibrils. This habit accounts for greater flexibility and higher tensile strength than other habits of the same mineral.” ASTM D5755 – 09 at 518-19.

ASTM D5756: defining asbestiform as “a special type of fibrous habit in which the fibers are separable into thinner fibers and ultimately into fibrils. This habit accounts for greater flexibility and higher tensile strength than other habits of the same mineral.” ASTM D5756 – 02 (2008) at 532-33.

Further, if a particle is deemed to be fibrous, it does not mean it is asbestiform, as noted, for example, in Campbell et al. (1997), which recognizes that “the term fibrous has been used ... to describe all kinds of minerals that crystallize in habits resembling organic fibers... asbestiform is a specific type of fibrosity.”¹²

Drs. Longo and Rigler appear to agree that asbestos has these qualities, although Dr. Longo calls this a “mineralogical definition.”¹³ Dr. Longo then distinguishes this from what he calls a “regulatory definition.” That is misleading, because in reality, Drs. Longo and Rigler are referring to the **counting criteria** in regulatory documents, not what asbestos is or is not. Indeed, some of the very documents that they use to draw this disingenuous distinction expressly **define** asbestos according to what Drs. Longo and Rigler want to call the “mineralogical definition,” *e.g.*, ISO 22262. Along the same lines, there are other criteria used under air sampling methodology (EPA

¹² Campbell et al. (1997) *Information Circular 8751*. U.S. Bureau of Mines.

¹³ 01/07/19 Longo Depo. 79:4-11 (“[asbestos] has to have high tensile strength, flexible splayed fibers, for asbestiform, and that’s a geological definition.”); 10/31/18 Longo Depo. 43:16-20 (“Q. And some of the features of asbestos growing in the asbestiform habit, as a geologist would use the term, have to do with tensile strength and flexibility; correct? A. That is the geological definition.”); 10/24/18 Longo Depo. 269:13-23 (“Q. So I believe you said that the definition of asbestiform habit that you just gave is not your definition, is that what you said? A. That’s correct. I mean, it’s the standard definition, it’s fibrous. Now, what it also says for asbestiform, that it has to have high tensile strength, it has to have splayed ends, it has to have this, it has to have that. That’s a geological definition”); 2/05/2019 Longo Depo. 222:2-17 (“Q. Do you agree with ISO 13794 that this method cannot discriminate between individual fibers of the asbestos and nonasbestos analogs of the same amphibole material? A. ... but, no, it does not meet the geological definition for asbestos, high tensile strength, flexible, and so on and so forth.”).

Asbestos Hazard Emergency Response Act, AHERA¹⁴ and EPA 600/R-93¹⁵) to describe fibers. In those documents, mean aspect ratios for populations of asbestos particles range from 20:1 to 100:1, which is inconsistent with the findings from Drs. Longo and Rigler. Certain protocols may look to whether the aspect ratios of detected particles are at least 3:1 for measurements by polarizing light microscopes¹⁶ and at least 5:1 for TEM measurements.^{17,18}

In other words, these aspect ratio dimensions alone do not imply that the observed particles are asbestos – there are non-asbestiform amphiboles and many other minerals that have aspect ratios above 3:1 or 5:1. Drs. Longo and Rigler confirmed this in their depositions.¹⁹ This is discussed in more depth below in Section VII.

C. Measurements of Concentration

Summary: An appropriate analytical technique must be used to determine the degree to which there is asbestos in a talc sample, depending on the level of any impurity.

If asbestos minerals are present in talcum powder, it is important to be able to assess their abundance. There are spectroscopic methods, such as visible, Raman, and infrared spectroscopies, that work well on such powders, but they cannot detect minor phases that are <~1%. Particles that are present in very low abundances (such as parts per million) are nearly impossible to quantify. The measurement of small amounts of asbestos as an impurity in talc in greater detail in Section V, below.

¹⁴ US Code Title 15, Chapter 53, Subchapter II. Asbestos Hazard Emergency Response, <https://www.govinfo.gov/content/pkg/USCODE-2011-title15/pdf/USCODE-2011-title15-chap53-subchapII.pdf>.

¹⁵ EPA/600/R-93/116, <https://tinyurl.com/y4z765xp>.

¹⁶ 40 C.F.R. 763, Subpart E, <https://www.govinfo.gov/content/pkg/CFR-2009-title40-vol30/pdf/CFR-2009-title40-vol30-part763.pdf>.

¹⁷ EPA/600/R-93/116, <https://tinyurl.com/y4z765xp>.

¹⁸ 40 C.F.R. 763, Subpart E, <https://www.govinfo.gov/content/pkg/CFR-2009-title40-vol30/pdf/CFR-2009-title40-vol30-part763.pdf>.

¹⁹ 2/5/19 Longo Depo. 246:5-15 (“Q. Okay. Is there anything in the published literature that you’ve seen that suggests that there are cleavage fragments with a greater than 5-to-1 aspect ratio? A. There’s been a number of published articles that state things like that, yes. Q. Are there any published articles that state that there are cleavage fragments that have greater than 3-to-1 aspect ratio? A. Yes, there is publications that state that.”); 2/6/19 Rigler Depo. 191:21-193:4 (“Q. Using a geological definition of asbestos, can you have a cleavage fragment that is greater than 5-to-1 aspect ratio? A. In my opinion, the answer to that is yes. Q. Okay. And using the geological definition of asbestos as you have used it, there can be an asbestiform particle that has an aspect ratio of below 3-to-1? A. Are you talking about what kind of particle? Q. Asbestiform particle. A. Smaller than 3-to-1? Q. Yeah. ... in most cases of that size, you know, you may see some that are in that range, but you have to use the PLM to see them, probably.”).

IV. MINERAL IDENTIFICATION USING CHEMICAL COMPOSITION: EDS

Drs. Longo and Rigler opine on the results of analyses done by their five analysts using electron dispersive spectroscopy (EDS or EDXA for x-ray spectroscopy).²⁰ This section discusses the use of EDS to the identification of mineral compositions.

A. How EDS Works

Summary: EDS, when properly used, can provide a limited analysis of the *chemical makeup* of certain mineralogical samples.

In this technique, an electron source is used to produce high-energy electrons that are focused onto a tiny spot on a sample. The electrons interact with the atoms in the crystal structure, causing a low-energy inner shell electron to be ejected from the atom. Higher-energy electrons from higher shells in that atom quickly drop down to fill the void, and in doing so, they release energy in the form of x-rays. The energy is characteristic of each element and reflects the spacing of the two shells involved, which is unique to each element. A detector counts how many electrons are scattered and at what energies. This produces a graph of energy (*x* axis) vs. counts (*y* axis) as shown in **Figure 2**.

[**Figure 2** on next page.]

²⁰ Both Drs. Longo and Rigler testified that they did not personally run any of the experiments on which they opine in their reports. Instead, they were involved in various levels of oversight and supervision. *See* 2/6/2019 Rigler Depo. 13:6-15 (“Q. Did you ever use a PLM for the purposes of this report? A. No, I did not. Q. Did you ever use a TEM for the purposes of this report? A. Not for the purposes of this report. Q. Did you ever use an XRD device for the purposes of this report? A. We do not have the XRD device or that type of device at our laboratory.”); 11/27/18 Longo Depo. 447:6-10 (“Q. Okay. For any of the analyses that were done for the November 14, 2018, report, were you the analyst that reported the findings on the bench sheets? A. No.”). There were five such analysts: four at Drs. Longo and Rigler’s laboratory, and one at J3, a laboratory not formally affiliated with Drs. Longo and Rigler. *See* 2/5/19 Longo Depo. 258:16-18 (“Q: [T]here were four people doing analysis in the MDL report; right? A: Correct.”); February 1, 2019 Report, at 4 (“MAS [i.e., Longo and Rigler] sent a number of historical J&J samples to J³ Resources for both PLM and XRD analysis using ISO 22262-1 and ISO 22262-3 protocols.”).

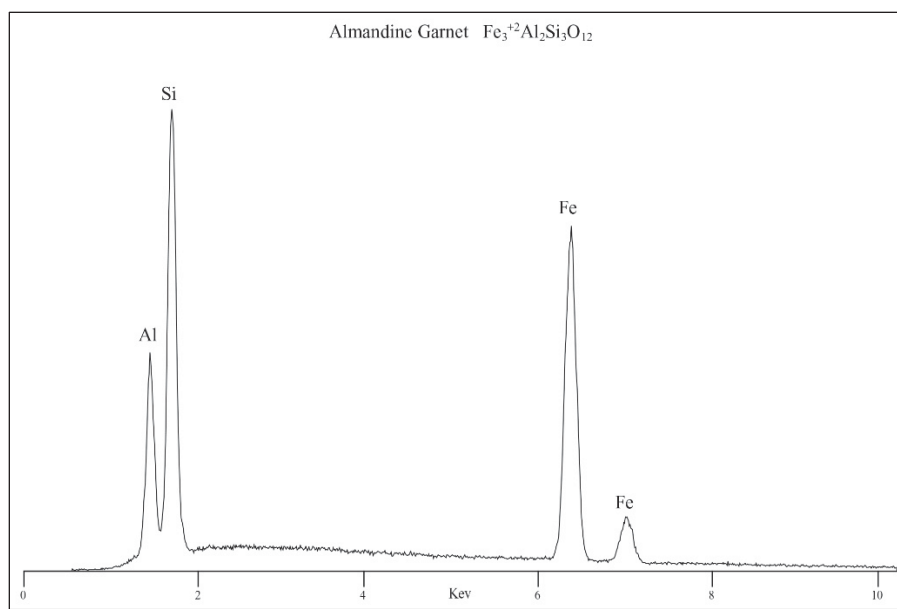


Figure 2. EDS spectrum of the mineral species almandine ($\text{Fe}_3\text{Al}_2\text{Si}_3\text{O}_{12}$) from the classic book by Severin (1984).²¹

Peaks in the EDS plots arise from individual elements, and the areas of the peaks are roughly proportional to the amounts present (e.g., Severin, 1984). In the example above, the mineral is almandine, which has a nominal formula of $\text{Fe}_3\text{Al}_2\text{Si}_3\text{O}_{12}$. There are three formula units of Si and three formula units of Fe. Notice how the total area of the Fe peaks is roughly comparable to the total area of the single Si peak because both elements are present in roughly equal proportions. There are only two formula units of Al, and that peak is thus somewhat smaller.

This example was purposely chosen to be simple. But in most EDS spectra, the correspondence between peak areas and elemental abundances is not so direct due to a host of factors²² (see Section B below). There are ways to correct for them, and every TEM instrument sold today includes a software package based on the same physical principles that can make the appropriate corrections via detailed calculations. Such calibrations are used to convert the areas to true (albeit semi-quantitative) elemental percentages in the mineral. Independent software is also available for this purpose (e.g., Desktop Spectrum Analyzer II²³ or XIDENT²⁴), which allows a user to import spectral files with a standard format and extract quantitative information from them.

Depending on the x-ray intensity and the type of detector used, some elements are difficult to measure by EDS. EDS **cannot** be used to quantify either hydrogen (H) or oxygen (O) accurately.

²¹ Severin (1984) *Energy Dispersive Spectrometry of Common Rock-Forming Minerals*, Kluwer.

²² Deriving quantitative information from an EDS spectrum is a complicated process due to instrumental (such as the type of window on the detector), experimental (which energy was used), and physical (absorption and fluorescence) factors. A nice summary of this is given at <https://cstl.nist.gov/div837/837.02/epq/dtsa2/>.

²³ <https://cstl.nist.gov/div837/837.02/epq/dtsa2/>.

²⁴ Rhoades (1976) *XIDENT – A computer technique for the direct indexing of electron diffraction spot patterns* (Research Report 70/76), <https://ir.canterbury.ac.nz/handle/10092/11515>.

Therefore, distinguishing among the minerals in talcum powder similar to talc (**Table 1**) requires that magnesium (Mg), iron (Fe), calcium (Ca) and silicon (Si) be distinctive for each phase and have x-ray peaks in the right energy region (0-10 keV), as seen in **Figure 2** above. EDS analyses are generally considered to be semi-quantitative for chemical analyses, with errors of about $\pm 5\%$ relative for major elements (Si, Al, Ti, Mg, Fe, Ca, Na, and K).^{25,26} **Attaining such accuracy requires use of a calibration and ideal experimental conditions.**

B. Factors Affecting Accuracy of EDS

Summary: EDS can distinguish many minerals from one another, but it has significant limitations when minerals from completely different groups have similar chemistries. For example, EDS cannot accurately distinguish anthophyllite *amphibole* from talc *sheet silicate* (or even enstatite *pyroxene*), or tremolite *amphibole* from diopside *pyroxene*.

Mineral identification based on EDS data alone is quite dependent on coaxing the best possible chemical data out of a semi-quantitative instrument. To a first order, the areas of each peak in an EDS spectrum reflect the concentration of that element.²⁷ But as noted above, other factors, such as particle geometry, spectrometer model, type of detector,²⁸ detector sensitivity, and the efficiency of x-ray generation, come into play as well to affect the peak areas, requiring sophisticated calibration to obtain interpretable results. **Figure 3** shows the EDS pattern of cummingtonite from the classic book of EDS patterns by Severin (1984). This mineral has a composition of $(\text{Mg,Fe})_7\text{Si}_8\text{O}_{22}(\text{OH})_2$.²⁹ Even though this sample has more Mg than Fe atoms, the peak areas are radically different due to the factors noted above: 5% for Mg and 26% for Fe. **In other words, the peak areas are not directly proportional to the abundances of the elements.**

[**Figure 3** on next page.]

²⁵ Newbury and Rotchie (2015) *Journal of Material Sciences*, **50**, 493-518; Miller and Mirtič (2013) *Geologija*, **56**, 5-17.

²⁶ Hafner, *Energy Dispersive Spectroscopy on the SEM: A Primer*, http://www.charfac.umn.edu/instruments/eds_on_sem_primer.pdf.

²⁷ Severin (2004) *Energy Dispersive Spectrometry of Common Rock Forming Minerals*. Springer, Kluwer.

²⁸ As noted by Dr. Longo in deposition, EDS instruments can have Si-drifted, Li-drifted, or windowless detectors. 2/5/19 Longo Depo. 101:8-23. He continues: “if it’s a light element detector, the magnesium can be a little higher, the silicon will be your primary peak, somewhere in the 25-30 percent of the magnesium for a non-light element detector. And the calcium peaks and the magnesium peaks are usually very similar in size.” 2/5/19 Longo Depo. 77:17-78:6.

²⁹ The ideal “end member” composition of cummingtonite is $\text{Mg}_7\text{Si}_8\text{O}_{22}(\text{OH})_2$, but it forms a continuous series with grunerite $(\text{Fe}_7\text{Si}_8\text{O}_{22}(\text{OH})_2)$ so it can contain up to 3.5 formula units of Fe. In the formula given above, the “Mg,Fe” is a notation that indicates that there is more Mg than Fe.

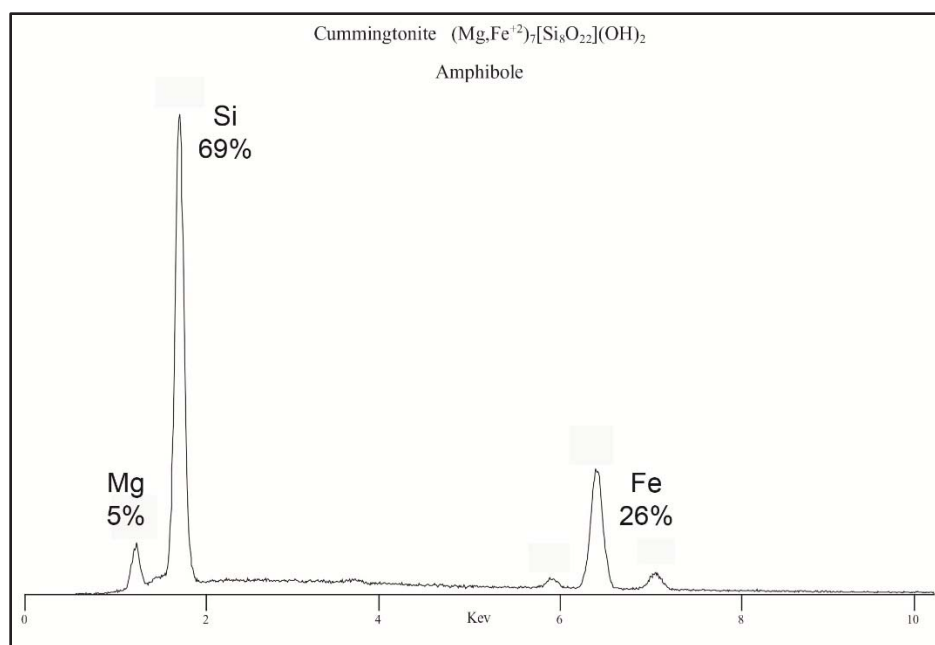


Figure 3. EDS spectrum of the mineral species cummingtonite, $(\text{Mg,Fe})_7\text{Si}_8\text{O}_{22}(\text{OH})_2$, from Severin (1984).³⁰

When proper calibrations are used, EDS has $\pm 5\%$ or larger error bars, making it only semi-quantitative under the best of protocols (i.e., not sensitive enough for subtle chemical differences).³¹ This can be a significant limitation on the usefulness of EDS in many contexts. For example, one way scientists use EDS readouts to roughly determine the chemical makeup of a sample is to use the ratio of the peak areas of the elements (e.g., $\text{Mg}+\text{Fe}$) to Si.³² The right-hand column of **Table 1** shows these ratios in some rock-forming minerals containing Si, Mg, Fe and Ca. Those data suggest that only accurate analyses will allow these minerals to be distinguished on the basis of chemistry alone, given the error bars of EDS. The most accurate methods (such as electron probe microanalysis, EPMA, which has a beam size $\sim 1000\text{-}20,000$ nm) can measure mineral chemistry well enough to tell these minerals apart, but these methods lack the excellent spatial resolution of EDS on a TEM, which is roughly 0.5 nm ($\sim 1000\times$ smaller than EPMA). Therefore, studies of asbestos-bearing rocks generally use EDS for chemical analyses, sacrificing accuracy for the ability to focus the beam on a tiny particle.

By way of specific example, **Figure 4** shows the Mg/Si ratios for selected **Table 1** minerals, along with propagated error bars of 5% , which are generally accepted best accuracies for analyses

³⁰ As noted on the previous page, the ideal “end member” composition of cummingtonite is $\text{Mg}_7\text{Si}_8\text{O}_{22}(\text{OH})_2$, but it forms a continuous series with grunerite ($\text{Fe}_7\text{Si}_8\text{O}_{22}(\text{OH})_2$) so it can contain up to 3.5 formula units of Fe. In the formula given above, the “Mg,Fe” is a notation that indicates that there is more Mg than Fe. Figure from Severin (1984) *Energy Dispersive Spectrometry of Common Rock-Forming Minerals*, Kluwer.

³¹ Newbury and Ritchie (2015) *Journal of Material Sciences*, 50, 493-518; Miller and Mirtič (2013) *Geologija*, 56, 5-17.

³² Severin (1984) 23 (it is possible to “determine the approximate relative concentrations of the element. The number of characteristic X-rays is, to a first order, related to the number of atoms of a particular element in the sample...”).

of particles and rough surfaces.³¹ The **dashed** purple line in **Figure 4** shows that anthophyllite and enstatite are identical within the error bars. The **dotted** purple line shows that talc and sepiolite are indistinguishable. Within these error bars, talc and anthophyllite are also identical because their error bars overlap (thick purple shaded line).

The analogous conclusions can be drawn from the diagram at right for tremolite (amphibole) and diopside (pyroxene), where the y axis is now (Mg+Ca)/Si. Again, these minerals have completely different crystal structures, yet their formulas are quite similar. The purple shaded bar here indicates how much these two minerals overlap. These two minerals would be indistinguishable to EDS, **even though they belong to completely different mineral groups** (amphibole and pyroxene, respectively) with very distinct properties.

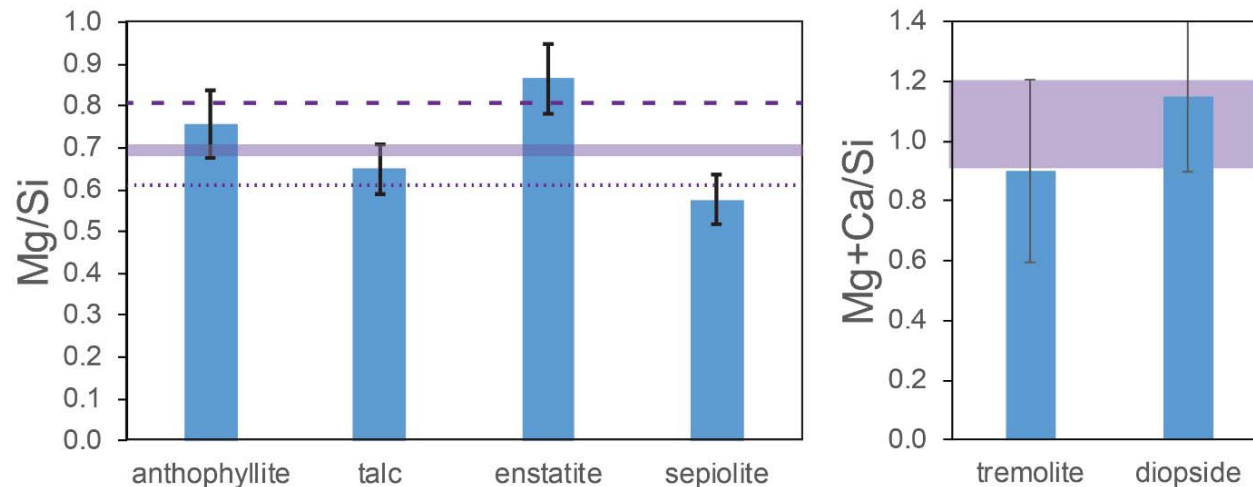


Figure 4. Ratios of the weight percentage of magnesium (Mg) to silicon (Si) along with propagated 5% errors on each measurement.³³ Formulas from webmineral.com with 5% errors added.

Further, the EDS results in the Longo/Rigler MDL Reports labelled as “tremolite” may very well be consistent with minerals other than diopside. Drs. Longo and Rigler have never produced their quantitative data and, accordingly, this analysis cannot be completed.³⁴

³³ For example, anthophyllite contains 28.78 wt.% Si and 21.79 wt.% Mg. EDS determines these values to within $\pm 5\%$, i.e., 28.78 ± 1.44 and 21.79 ± 1.09 . So $Mg/Si = 0.65$ and the propagated error on Mg/Si is ± 0.08 . The same calculation is done here for talc, enstatite, sepiolite, tremolite, and diopside.

³⁴ For example, these may include at least monticellite, bredigite, merwinite and rondorfite, which are other minerals that contain only Si, Mg and Ca. Many more common mineral species would be included in this list if Fe and Na were allowed as possible chemical constituents.

C. The Analysts Used By Drs. Longo And Rigler Do Not Use EDS In A Way Accepted By The Scientific Community, Resulting In Unsupportable Conclusions

Summary: The “eyeball” method of estimating EDS data employed by Drs. Longo and Rigler is not considered reliable by the scientific community. Drs. Longo and Rigler do not report the quantitative data one needs to make scientifically valid conclusions, and their conclusions are therefore unsupportable.

It is clear that Dr. Longo does not understand the limitations of EDS results that are explained above. He states, “I believe every spectra in here is quantitative EDS analysis” (2/5/19 Longo Depo. 72:22-23). He explains how his analysts use peak ratios (like those above) to identify minerals based on EDS spectra. To identify tremolite from anthophyllite, “[y]ou have a magnesium and calcium peak that are pretty close. Typically the calcium peak can be a little lower. ... the magnesium can be a little higher, the silicon will be your primary peak, somewhere in the 25 to 30 percent of the magnesium ... [a]nd the calcium peaks and the magnesium peaks are usually very similar in size. And then we look at the amount of iron to see if we’re going to call it actinolite or tremolite. And not aware of any other minerals out there that have those ratios, so that’s how I call it tremolite.” (2/5/19 Longo Depo. 77:14-78:6).

It is apparent from these remarks that Dr. Longo, who admits he has never taken any courses in mineralogy (2/5/19 Longo Depo. 16:2-3), is unaware of the breadth of other possible minerals that can match these EDS patterns within the known analytical errors. His methodologies are contrary to those that are accepted in the scientific community.

D. EDS Data from Drs. Longo And Rigler Show Great Variability

Turning now to EDS data in the Longo/Rigler MDL Reports, **Figure 5** shows several different talc spectra. Note the variable amounts of Fe in the sample, and the varying ratio between the intensities of the Mg and Si peaks. Do these grains really have different compositions, or are the variations from analytical imprecision? It would only be possible to make this determination with calibrated data.

[**Figure 5** on next page.]

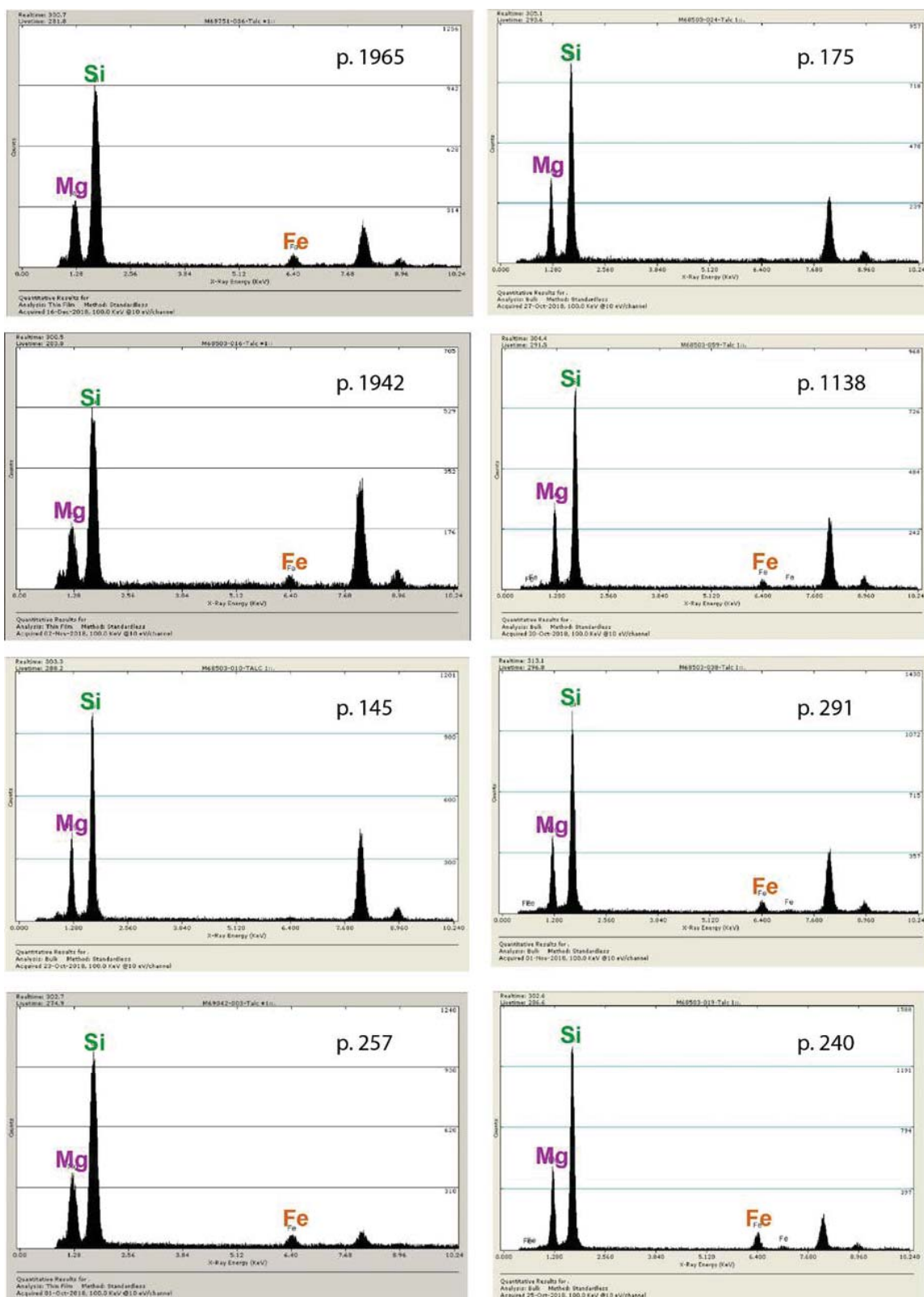


Figure 5. Talc spectra in the January 2019 Longo/ Rigler MDL report, showing variable ratios between the intensity/area of the Mg and Si peaks. Note also the varying amounts of Fe in these talcs.

Similarly, **Figure 6** shows a number of different anthophyllite spectra from the January 2019 MDL Report. Although these are all identified as “anthophyllite,” they could be almost any mineral containing Mg and Fe but no Ca (cf. top portion of **Table 1**).

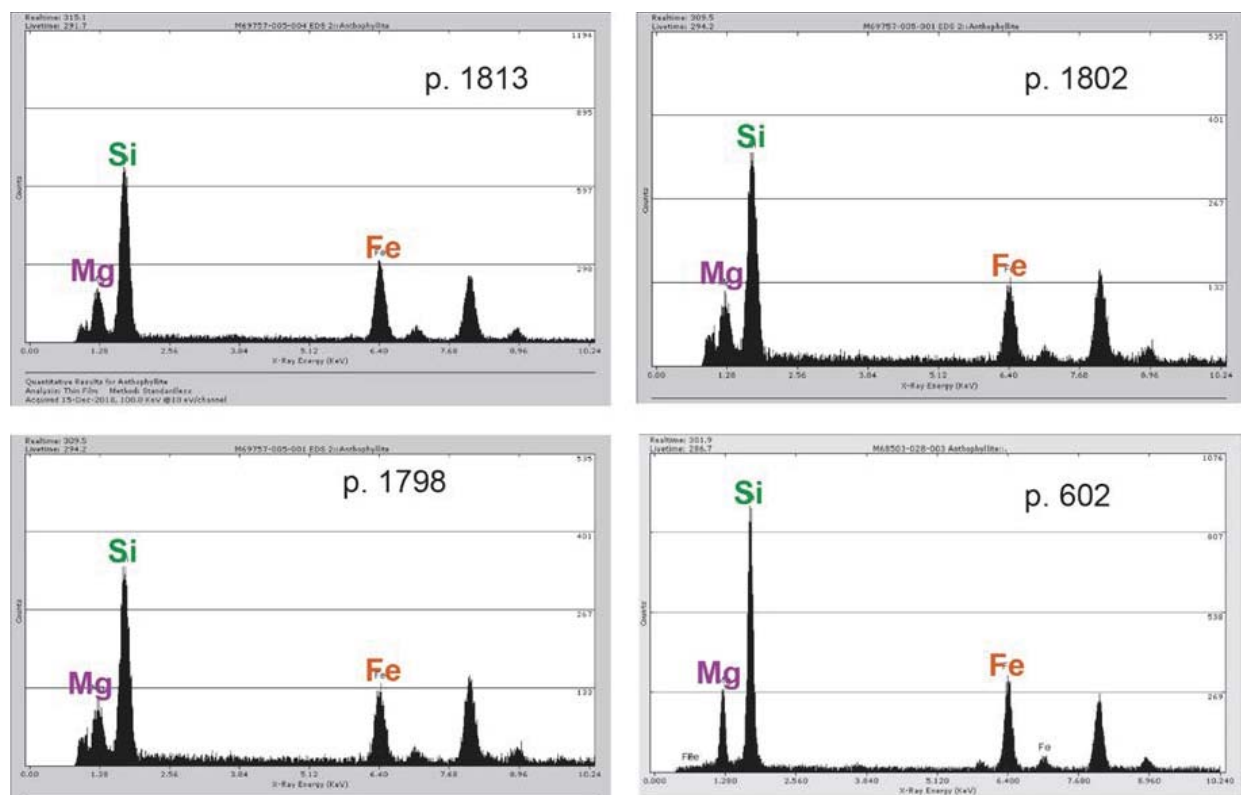


Figure 6. Anthophyllite spectra in the January 2019 Longo/ Rigler MDL report showing Fe peaks that are larger than Mg peaks.

In fact, these spectra in **Figure 6** closely resemble the spectrum of cummingtonite shown in **Figure 3**. Without a calibration to correct the peak areas for experimental variables, it is quite difficult to determine which minerals are present. Moreover, the formula of anthophyllite, $(\text{Mg,Fe})_7\text{Si}_8\text{O}_{22}(\text{OH})_2$ should have much more Mg than Fe, which is clearly not the case here.

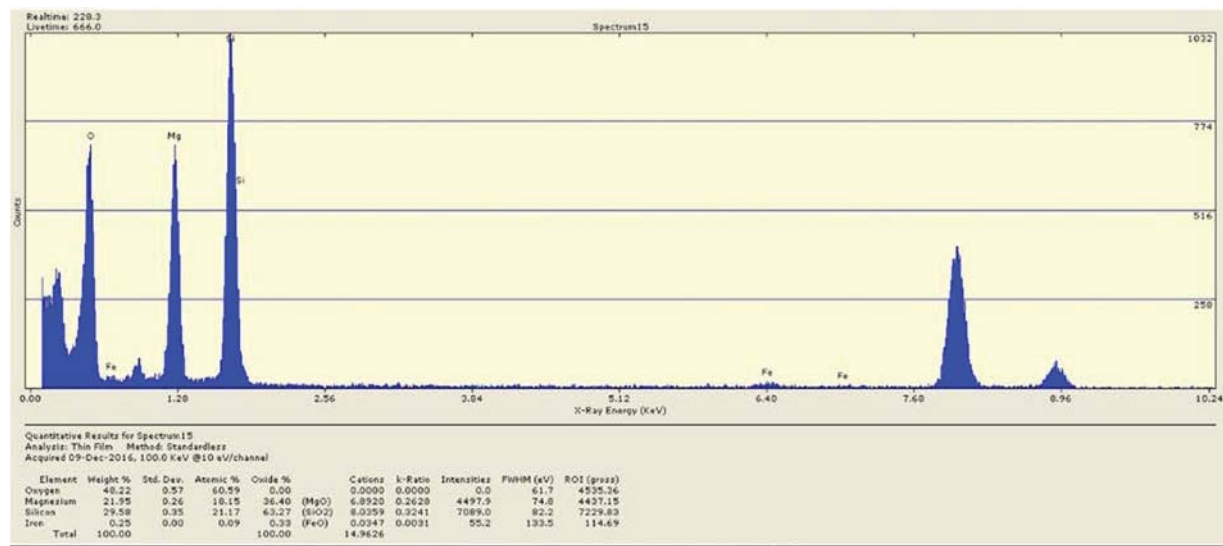
It is **nearly impossible to tell some of these spectra apart** solely by visual inspection of their EDS patterns. Calibrations are needed to produce optimal, albeit semi-quantitative, results. These graphs show why the calibration procedure to convert from peak areas to elemental concentrations is routinely part of the software that comes with a TEM instrument.³⁵ It is irresponsible for Drs. Longo and Rigler to choose not to employ calibration software to assist with their mineral identifications.

³⁵ This calibration is done using first principles calculations or by comparison with spectra of a small number of standards with known compositions, as described in Newbury (1995) “Standardless” quantitative electronic probe microanalysis with energy-dispersive x-ray spectrometry: Is it worth it? *Anal. Chem.*, **67**, 1866-1871.

E. Drs. Longo And Rigler And Their Analysts Appear to Have Deliberately Avoided Reporting The Data That Would Actually Be Useful Here

Summary: EDS instruments and their accompanying standard software are capable of produce numerical data on chemical composition. Drs. Longo and Rigler appear to have deliberately avoided producing or reporting those data.

The more information extracted from an EDS analysis, the more a scientist can narrow down the composition of the subject mineral. A typical EDS output is shown in **Figure 7**, with each peak identified on the screen and the quantitative analysis given below the spectrum. Results include a listing of each element in weight %, the standard deviation of that number based on repeat analyses,³⁶ atomic %, and cations (positively charged ions), along with the total weight % of the summed elements.



Quantitative Results for Spectrum15
Analysis: Thin Film Method: Standardless
Acquired 09-Dec-2016, 100.0 KeV @10 eV/channel

Element	Weight %	Std. Dev.	Atomic %	Oxide %	Cations	k-Ratio	Intensities	FWHM (eV)	ROI (gross)
Oxygen	48.22	0.57	60.59	0.00	0.0000	0.0000	0.0	61.7	4535.36
Magnesium	21.95	0.26	18.15	36.40 (MgO)	6.8920	0.2628	4497.9	74.8	4437.15
Silicon	29.58	0.35	21.17	63.27 (SiO2)	8.0359	0.3241	7089.0	82.2	7229.83
Iron	0.25	0.00	0.09	0.33 (FeO)	0.0347	0.0031	55.2	133.5	114.69
Total	100.00			100.00		14.9626			

Figure 7. Mostly amphibole EDS spectrum from the Connecticut Geological Society using the eZAF Smart Quant calibration, from their web site at <https://www.geologicalsocietyct.org/geoconnections-articles/recent-analyses-of-connecticut-amphiboles>.

Asked whether their EDS tools could produce this information, Dr. Rigler agreed. Looking at the precise readout that is in **Figure 7** above, he testified:

³⁶ Notice that accuracy is not given in the output – only precision (“Std. Dev.” in the table below the figure).

Q. Okay. It is from your report. So is that what an EDXA spectra looks like?

A. Yes.

Q. And you'll notice on the bottom left-hand corner it says elements and it has got some elements and it says total?

A. Yes.

Q. Your software can generate information that fills in that; correct?

A. Yes.³⁷

The quantitative data are conspicuously lacking from all the EDS patterns in the Longo/Rigler MDL Reports. It is also curious that the printouts of EDS patterns from the Longo/Rigler MDL Reports list the elements chosen by the analyst (Mg, Si, etc.), followed by the word "Total," which implies that a column of numbers to the right of the element list gives a listing of peak areas. In the more typical EDS analysis from another lab, as seen in **Figure 7**, the composition is given in cations as $\text{Si}_{8.04}\text{Mg}_{6.98}\text{Fe}_{0.03}$. It would be very difficult to obtain these numbers simply by looking at the graph.

Yet the EDS protocol in the lab of Drs. Longo and Rigler does exactly that – the analysts "eyeball" the spectra and decide which mineral is present based on the peak areas.³⁸ This practice cannot be justified because it is highly subjective. Compositions are not given for any of the EDS patterns produced by Drs. Longo and Rigler, even though their EDS is equipped to provide this data.

Dr. Longo states that the quantitative numbers are "not something that's required to render my opinion in this case."³⁹ He also states that "you can't look at the areas, but the peak ratios is what's important here."⁴⁰ This practice of identifying mineralogy by visual inspection of EDS data may be defensible in other applications undertaken at Drs. Longo and Rigler's lab **where the material being tested is already known**. In such cases, EDS is used simply to distinguish among the known minerals. But "eyeballing" of compositions is completely inappropriate in talc testing because of the many different minerals that could be present and how similar they may appear.

Mineral identifications (like those in **Figure 7**) might have been easier if quantitative peak area data had been presented in the Longo/Rigler MDL Reports. It is a standard capability of EDS software to generate elemental composition data (literally one click of a button), but those data are missing from the Longo/Rigler MDL Reports. Had the list of peak areas for individual elements been included in the reports, these data could have corroborated the mineral species identifications made by the other techniques (e.g., PLM by Lee Poye at J3 Resources, Inc.). But because those

³⁷ 2/6/19 Rigler Depo. 55:23-56:7 (emphasis added).

³⁸ 2/5/19 Longo Depo. 81:18-83:14; 2/6/19 Rigler Depo. 96:24-97:12.

³⁹ 2/5/19 Longo Depo. 83:15-20.

⁴⁰ 2/5/19 Longo Depo. 76:10-14.

data are missing, little useful information can be gleaned from the EDS plots beyond the presence/absence of Ca.

F. Lack Of Data On And Misuse Of Standards

Summary: Dr. Longo testified that his analysts used “reference standards” of asbestiform minerals in their analysis, but Drs. Longo and Rigler did not produce any, and no such standards exist that could match the Longo/Rigler “eyeball” methodology.

In his deposition, Dr. Longo stated that “they routinely check reference samples,”⁴¹ although none of the reports say this.⁴² This lack of data on reference standards makes it impossible to assess the accuracy of the SAED analyses in the Longo/Rigler MDL Reports. Dr. Longo further states that his lab has asbestos reference samples “on the TEM walls.”⁴³ In other words, in the laboratory of Drs. Longo and Rigler, analysts match the asbestos EDS patterns on their screens to ones printed out and hanging on the walls. Because the only reference standards used by the analysts are for asbestos minerals, the confirmation bias is apparent. It virtually guarantees that a particle they identify on the basis of EDS patterns will be asbestos, regardless of whether it really is.

G. Species Identifications Vary By Date And By Analyst

Summary: The mineral species identifications in the Longo/Rigler MDL Reports are not only scientifically indefensible, they appear demonstrably biased according to the particular EDS operator.

Because the mineral species identifications in the Longo/Rigler MDL Reports were made by naked-eye review of the EDS spectra, it would likely be difficult for different analysts to produce comparable results, and in fact, it was. **Figure 8** shows the distribution of mineral species by analyst. Despite the fact that most of these individuals worked on the project over time from 2018-2019 and the samples were randomly selected,⁴⁴ the **results appear to be biased by each operator’s perceptions of peak intensities**. For example, Lee Poye identifies only anthophyllite. Mehrdad Motamedi and Anthony Keaton consistently find more tremolite than anthophyllite, and Jayme Callan finds more anthophyllite. It is difficult to understand how this could happen if the samples they were testing were randomly distributed.

[**Figure 8** on next page.]

⁴¹ 2/5/19 Longo Depo. 41:10-18.

⁴² 2/5/19 Longo Depo. 45:9-12.

⁴³ 2/5/19 Longo Depo. 41:10-18.

⁴⁴ 2/5/19 Longo Depo. 45:13-20 (“Q: How does your lab distribute samples to individual analysts to test? Is it random? Is it like some analysts get a certain kind of sample? A: It’s random. Q: Is that the same for J3? Did you give them random samples? A: Random samples.”).

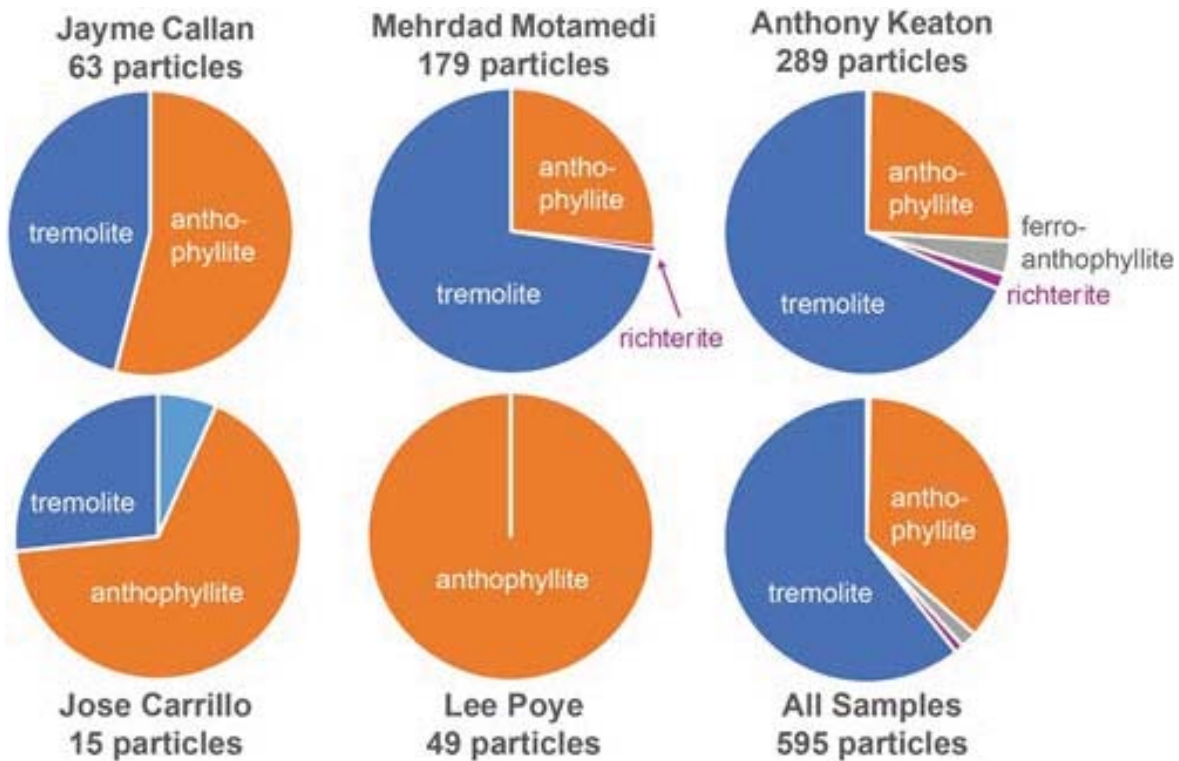


Figure 8. Distribution of mineral species identifications sorted by analyst for all samples reported to date.⁴⁵

If all samples were assigned to analysts at random, then the distribution of mineral species should all be the same.

Perhaps the distribution of mineralogy seen in **Figure 8** was the result of which localities each analyst happened to receive? For example, data in the Longo/Rigler MAS Reports indicate that samples mined from Vermont appear to have ~75% anthophyllite and 25% tremolite. So both Lee Poye and Jose Carrillo, who analyzed only Vermont samples (**Figure 9**), should have identical 75/25 ratios of anthophyllite/tremolite, and they do not.

[**Figure 9** on next page.]

⁴⁵ This compilation includes all grains for which mineral species were identified with dimensions (i.e., TEM data) in each of four of the reports: 1) *Supplemental Expert Report & Analysis of Johnson and Johnson Baby Powder and Valeant Shower to Shower Talc Products for Amphibole Asbestos* March 11, 2018, 2) *Analysis of Historical Johnson's Baby Powder M69042* October 2018, 3) *The Analysis of Johnson & Johnson's Historical Baby Powder & Shower to Shower Products from the 1960's to the Early 1990's for Amphibole Asbestos* November 14, 2019, and 4) *The Analysis of Johnson & Johnson's Historical Product Containers and Imerys's Historical Railroad Car Samples from the 1960's to the Early 2000's for Amphibole Asbestos* January 15, 2019. This analysis thus includes data on 163 samples, with some repetition.

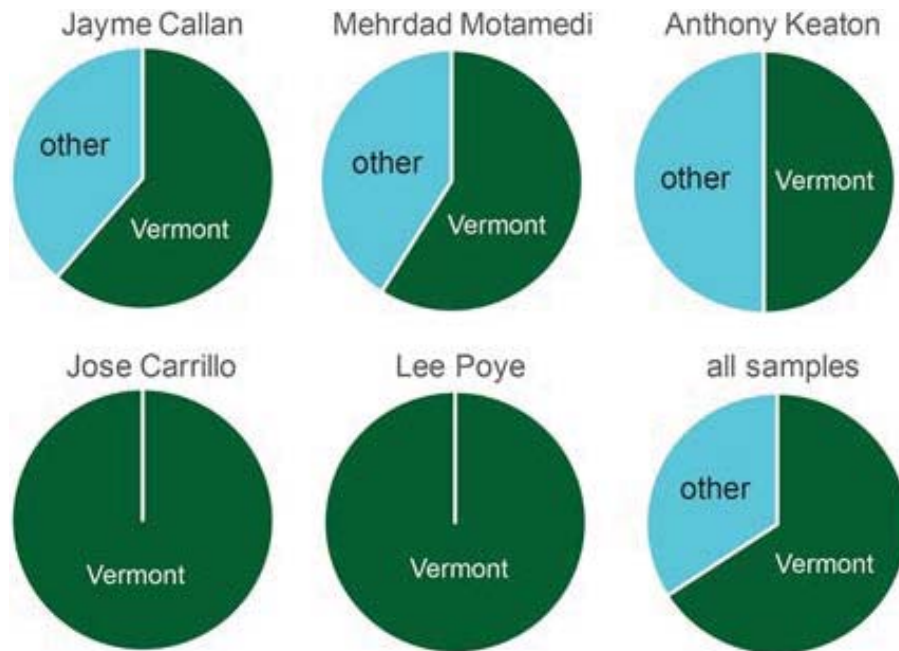


Figure 9. Distribution of mineral species identifications from Vermont vs. all other localities, sorted by analyst for all samples reported to date.

In other words, there is no justifiable explanation for why some analysts find different numbers of each mineral species. The logical conclusion is that the mineral species identifications are inconsistent and non-repeatable.

Furthermore, **Figure 10** shows that species identifications also appear to change over time.

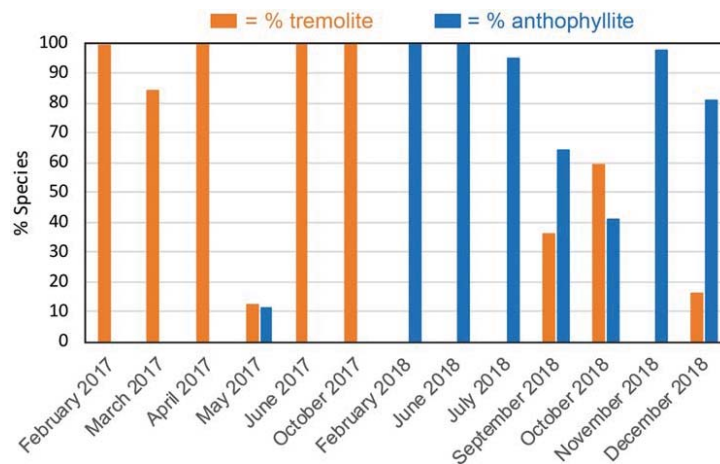


Figure 10. Comparison of the identification of mineral species by the analytical team of Drs. Longo and Rigler over time. Colors and data sources as in **Figure 8**.

Most of the mineral species identified in 2017 were tremolite, while most of the sample species identified in 2018 were anthophyllite. This could only happen if the samples analyzed in 2017 were all from the same tremolite-bearing locality. But this would be unlikely if all samples were randomly tested.

These variations cast doubt over *all* EDS-based species assignments made by this team, and therefore make it unlikely that any asbestos mineral species could be identified on the basis of these EDS data. This conclusion is of no surprise given the analytical uncertainties of the technique, as explained above.

H. Conclusions Regarding EDS

- **The generally accepted error bars on EDS chemical analysis indicate that it is impossible to easily discriminate amphibole (or any other minerals with similar compositions) species from talc using this technique.** The compositions of a wide range of Si-Mg-Si minerals are so similar that EDS, especially qualitative EDS as used here, cannot distinguish among them.
- **EDS spectral printouts alone are insufficient to discriminate any particular mineral species.** It is impossible to tell anything quantitative about these compositions without calibrated results, which could easily have been produced by Drs. Longo and Rigler or their assistants using software already built into their instruments. Instead, the analysts “eyeballed” the mineral identifications, and compared their spectra only to known asbestos minerals without considering other possible phases that could have similar EDS data.
- **Drs. Longo and Rigler and their analysts thus used a flawed methodology that resulted in wildly inconsistent results across different analysts and over time.** In science, proof involves demonstrating that a result is replicable. Because the Longo/Rigler MDL Reports show no actual data (i.e., percentages of each element derived from a calibration) of any kind to substantiate their mineral species assignments, these results are not credible and cannot be scientifically considered.
- **EDS patterns alone cannot determine the morphology of a mineral particle.** Even if a EDS pattern can be matched with a specific mineral, this only identifies which mineral species is present. Such analysis cannot determine whether or not the mineral is asbestiform.

V. MINERAL IDENTIFICATION USING CRYSTAL STRUCTURE: SAED

The alternative to analyses from EDS is to identify minerals based on their crystal structure – i.e., the arrangement of the atoms. Analytical approaches to this problem generally exploit how energy in the form of light or x-rays passes through the arrangement of atoms in a crystal. The success of any technique in identifying a specific mineral species is dependent on the distinctiveness of each species' crystal structure.

A. Introduction To Selected Area Electron Diffraction (SAED)

Summary: SAED, when properly used, can be used to create patterns of dots. When properly analyzed, these patterns can identify the *crystal structure* of the sample. This is done using the “*d-spacing*,” corresponding to spaces between the dots.

A transmission electron microscope (TEM), the same instrument used for EDS, is employed to acquire SAED patterns. For SAED, the waves of electrons pass through the crystal structure and interact with the atoms, which act as a diffraction grating. Some electrons travel straight through the sample and others are scattered by the atoms. By using each mineral's unique crystal structure, the amount by which the electrons are diffracted can be calculated. In the resultant pattern of dots (e.g., **Figure 11**), **spacings between dots are inversely proportional to the spacings between atoms.**⁴⁶ Thus, the arrangement of dots can be diagnostic of a mineral structure.

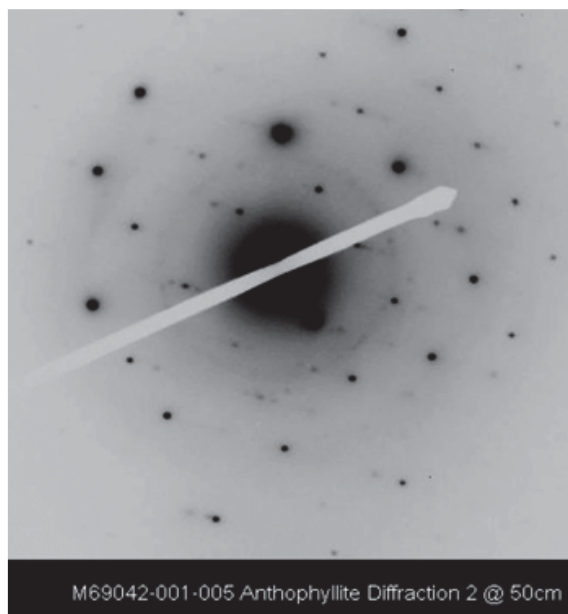


Figure 11. SAED pattern of M9042-001-005 from page 64 of the 2019.1.16 Longo/Rigler MDL report.

Optimal SAED patterns are acquired when the individual crystal happens to be lying with a zone axis parallel to the electron beam. This is most easily done when a crystal exhibits elongate (like an amphibole) or sheet-like (sheet silicates) morphology. To obtain these special

⁴⁶ Dyar and Gunter (2008) *Mineralogy and Optical Mineralogy*. Mineralogical Society of America.

orientations, most instruments allow the stage to be tilted to produce an optimal pattern, but this requires considerable skill and time.⁴⁷ In other words, the crystal must be oriented to obtain a zone axis pattern in which the reflections line up to produce an interpretable pattern.

B. To Uniquely Identify An Unknown Mineral, SAED Patterns Should Be Taken From Multiple Axes

Summary: Multiple SAED patterns along multiple “zone axes” are required to uniquely identify a mineral.

For an accurate identification of an unknown mineral, at least two (and preferably more) SAED patterns must be taken with the sample oriented along a known zone axis.⁴⁸ Consider this simplified analogy: imagine a cube, with an atom at every corner, and in the middle of each face (Figure 12).⁴⁹

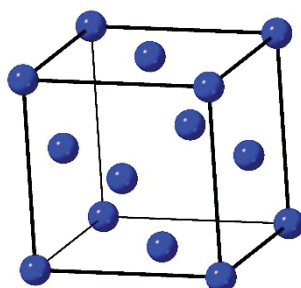


Figure 12. Crystal structure of copper, which is simply a cube with atoms at the corners and in the middle of each face. Viewed at this angle, the pattern of atoms can be easily discerned.

If the cube is held with only one side facing the viewer, the corners would line up, and it would look something like Figure 13, with its SAED pattern shown at right.

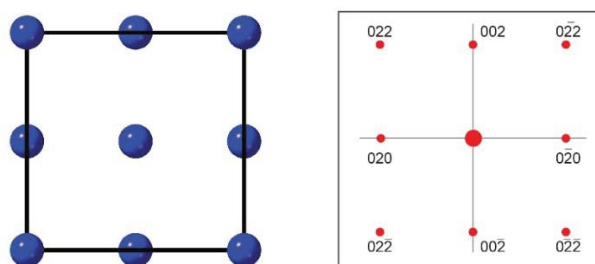


Figure 13. Crystal structure of copper, with a face of the cube facing the viewer.

The resultant SAED pattern of the orientation in Figure 13 is shown to the right. From this perspective, it is impossible to tell where all the atoms are – do they lie on the edges and corners,

⁴⁷ ISO 22262-1 document, page 65.

⁴⁸ Yamate, EPA (1984).

⁴⁹ This example happens to be the structure of pure copper, taken from Wyckoff R W G (1963) Second edition. Interscience Publishers, New York, New York, cubic closest packed structure. *Crystal Structures* 1:7 - 83.

or on faces and corners, or both? How tall is this shape? Is it a cube or a rectangle with a square end? Viewed from only one angle, these questions cannot be answered.

So a view from a different angle, as seen in **Figure 14**, is needed to confirm where all the atoms are located. Now it can be seen that this is a cube with atoms at the corners and in the center of each face.

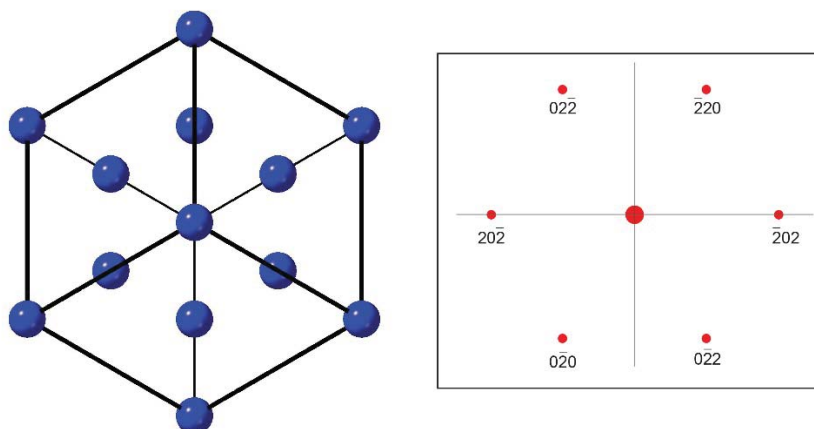


Figure 14. Crystal structure of copper, viewed along a diagonal with opposite corners held vertical to the viewer. The resultant SAED pattern is shown at right.

This example highlights the fact that a combination of views from different angles is needed to determine the full structure. Most minerals are far more complicated, and SAED patterns are correspondingly complex, but this is the gist of why multiple SAED images are required to identify a mineral.

By way of example, the patterns in **Figure 15** are the three SAED patterns for tremolite looking down the three zone axes. Note that each image is different. Each image taken in isolation can correspond to other minerals,⁵⁰ but together these three uniquely identify tremolite.

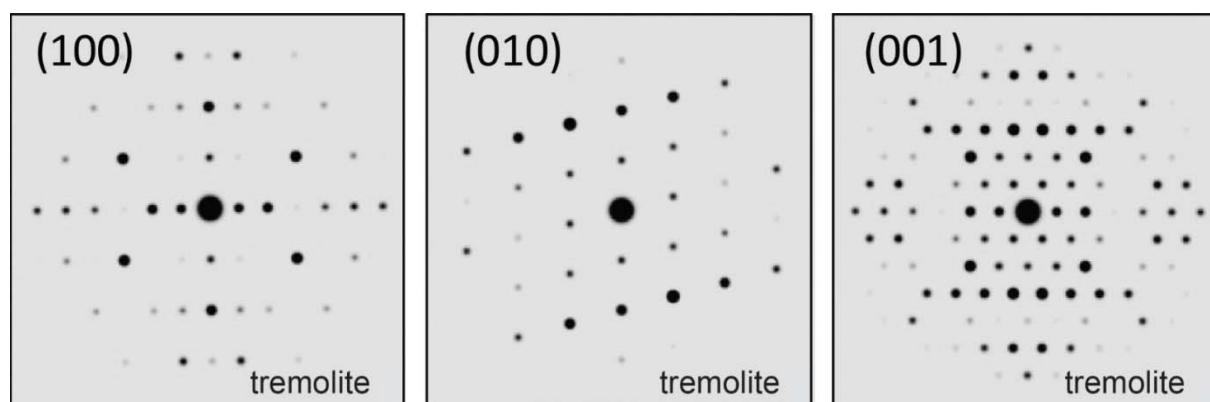


Figure 15. Simulated SAED patterns for tremolite projected onto different crystallographic orientations, indicated by the numbers in parentheses in each pattern. Adapted from Figure 15.2 in Dyar and Gunter (2008).

⁵⁰ Yamate, EPA, 1984.

The difference between a real SAED pattern (**Figure 11**) and a simulated one (**Figure 15**) demonstrates the importance of operator skill in acquiring these patterns.

It is not a simple process to align a sample on a zone axis parallel to the electron beam. The ISO 22262-1 document, page 65, explains it like this:

“Rotate the sample until the fibre image indicates that the fibre is oriented with its length coincident with the tilt axis of the goniometer, and adjust the sample height until the fibre is at the eucentric position. Tilt the fibre until an ED pattern appears which is a symmetrical, two dimensional array of spots. The recognition of zone-axis alignment conditions requires some experience on the part of the operator. During tilting of the fibre to obtain zone-axis conditions, the manner in which the intensities of the spots vary should be observed. If weak reflections occur at some points on a matrix of strong reflections, the possibility of twinning or multiple diffraction exists, and some caution should be exercised in the selection of diffraction spots for measurement and interpretation. It is important to recognize that not all zone-axis patterns that can be obtained are definitive.”

C. SAED Images In The Longo/Rigler MDL Reports Are Of Very Low Quality And Are Poorly Documented

Summary: The Longo/Rigler MDL Reports use visual inspection of low-quality and poorly documented images, which cannot uniquely identify minerals unless one has already concluded one is looking at asbestos *prior* to the SAED analysis.

As can be seen in examples from one of the Longo/Rigler MDL Reports (2018.1.16) in **Figure 16**, not all of the SAED patterns in the Longo/Rigler MDL Reports look like anything close to those in **Figure 15**. Most of these patterns are inconclusive and inconsistent, depending on the orientation of each crystal and its likely mineralogy.

[**Figure 16** on next page.]

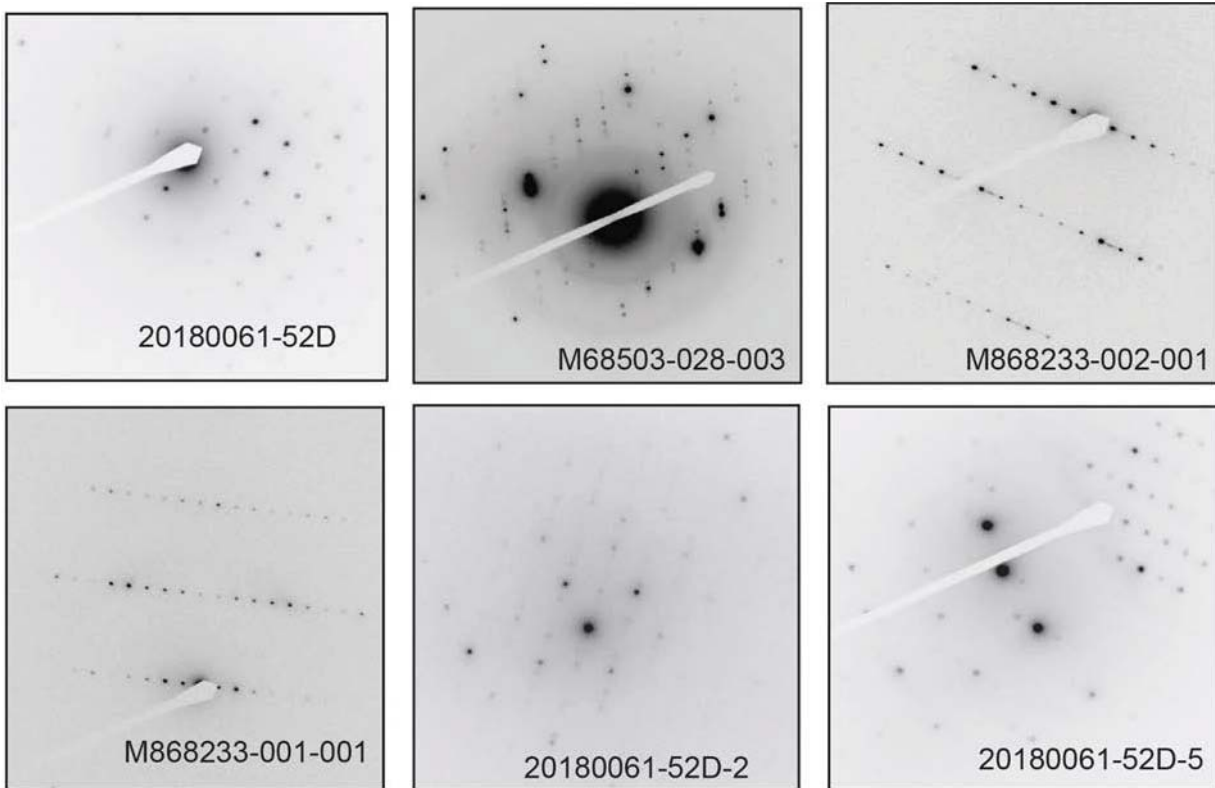


Figure 16. SAED patterns for “anthophyllite” from the 2019.1.16 Longo/Rigler MDL Report.

Most of these images are of such low quality that they can only be used to indicate that this is a crystalline material. With only a few exceptions,⁵¹ the reports do not indicate at what orientation each image was taken. Finally, spacings and angles between the dots are given only for a handful of samples given in the *Diffraction Verification* documents (see below). The SAED patterns are labeled with mineral species names using only visual inspection based on operator experience,⁵² a methodology for which the Longo/Rigler MDL Reports cite no support. This practice may be able to distinguish among species for materials that are already known to contain asbestos, but it may fail in the applications where the spectrum of possible mineralogy is broad. The use of only visual inspection shows a lack of understanding of the complexity of identification of these minerals using electron diffraction.

⁵¹ In the *Diffraction Verification* documents, some zone axes are indicated, but only for a subset of particles examined. In the main reports, no information on orientation is given.

⁵² See 2/5/19 Longo Depo. 246:22-47:4.

D. The SAED Patterns In The Longo/Rigler MDL Reports Do Not Uniquely Identify Tremolite Or Anthophyllite

Summary: The *d*-spacing information given for the SAED patterns in the Longo/Rigler MDL Reports does not uniquely identify tremolite and anthophyllite because their methodology is flawed and inadequate.

It is not clear that Drs. Longo and Rigler's analysts even used the *d*-spacing values for their SAED images. Drs. Longo and Rigler testified that the *d*-spacing numbers that they produced (in their *Diffraction Verification* documents) were only used **after** the mineral identification as a way of "verifying" results.⁵³ If true, Drs. Longo and Rigler did not interpret the SAED patterns in a manner consistent with generally acceptable scientific principles, and indeed, Drs. Longo and Rigler do not cite any publication for interpreting a SAED report without using the *d*-spacing. Dr. Rigler testified that these numbers were generated after the initial expert reports were served,⁵⁴ but then changed his testimony when confronted with the implications of this (that conclusions were made without consulting *d*-spacings).⁵⁵

Either way, the *d*-spacing values in the Longo/Rigler MDL Reports do not allow identification of tremolite and anthophyllite. Specifically, in the *Diffraction Verification* documents provided by Drs. Longo and Rigler, SAED patterns are "read" from 219 patterns from six samples by measuring and calculating the spacings between rows of dots. In those patterns, the space between the lines was measured and then converted to units of angstrom (\AA)⁵⁶ using an **unspecified constant**. Lacking knowledge of that constant, *d*-spacings cannot be easily verified for the patterns in the Longo/Rigler MDL Reports.⁵⁷

Take the following **Figure 17** as a specific example of a Longo/Rigler SAED pattern, to exemplify one of the many problems with their SAED analysis:

[**Figure 17** on next page.]

⁵³ 2/6/19 Rigler Depo. 116:22-118:17; 2/5/19 Longo Depo. 182:16-183:11.

⁵⁴ 2/6/19 Rigler Depo. 118:6-14.

⁵⁵ 2/6/19 Rigler Depo. 127:2-129:3.

⁵⁶ The diffraction camera constant is unique to each particular TEM instrument, as well as the magnification and focal length used to obtain the pattern, and is expressed in units of $\text{mm} \times \text{\AA}$. It is divided by the distance between two adjacent dots to arrive at the *d*-spacing values. According to Dr. Rigler, the lab uses calculations based on lattice parameters of gold to calibrate their SAED patterns. 2/6/19 Rigler Depo. 114:20-115:3.

⁵⁷ In the *Diffraction Verification* documents, the camera constant is given, but it is specified in units of pixels. Because the images have been scanned, it is impossible to apply that constant to the images, and thus the spacings cannot be verified.

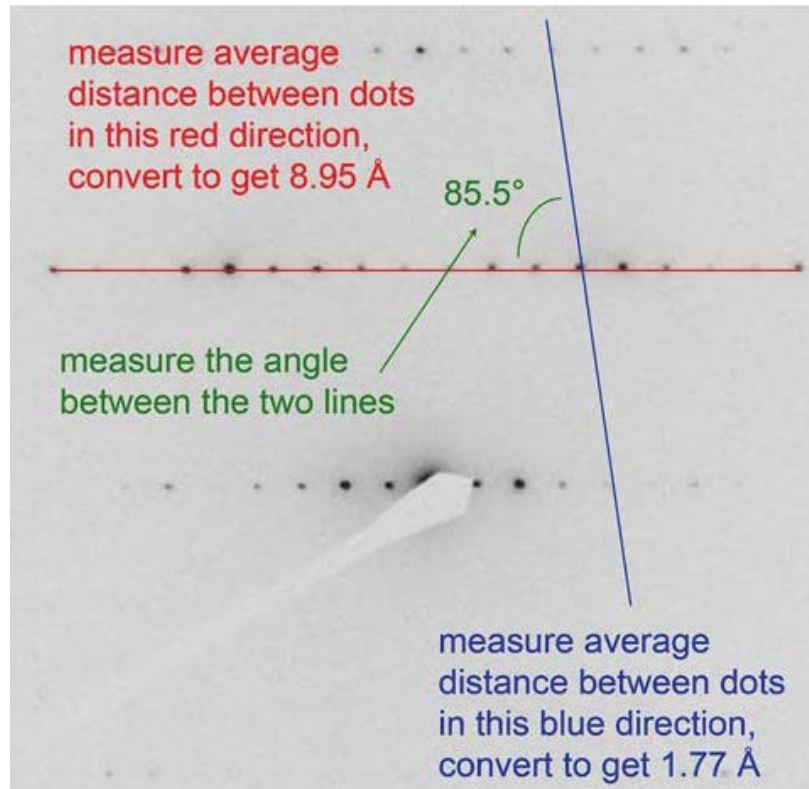


Figure 17. SAED pattern of M68233-001-001 from p. 693 of the 2019.1.16 Longo/Rigler MDL Report (colored annotation added).

For the example shown in **Figure 17**, the relevant values are $d(hk0) = 8.95 \text{ Å}$, $d(hkl) = 1.77 \text{ Å}$, and $\theta = 85.5^\circ$. Next, it is necessary to find those three values in “look-up tables.” Below is the only look-up table that Drs. Longo and Rigler used (found on each “Diffraction Verification” page):

Amphibole Type	Pg. #	Card #	Calculated Spacing	Range +/- 5%
Grunerite	449	31-631	5.2	4.94 - 5.46
Actinolite	4	25-157	5.13	4.87 - 5.39
Tremolite	1192	13-437	5.09	4.84 - 5.34
Crocidolite	993	19-1061	5.19	4.93 - 5.45
Anthophyllite	48	9-455	5.28	5.02 - 5.54

This means that **Drs. Longo and Rigler used tables only for the five recognized asbestos amphibole species and therefore did not check to see if their values corresponded to non-asbestiform minerals.**⁵⁸ To the extent Drs. Longo and Rigler already concluded they were looking at asbestos prior to the SAED analysis, as strongly implied by the table, their analysis was predetermined and conclusion-oriented, not scientific.

⁵⁸ 2/6/19 Rigler Depo. 101:2-17.

E. Drs. Longo And Rigler Use Incomplete *d*-Spacing Data

Summary: Use of only one *d*-spacing value, as reported by Drs. Longo and Rigler and their analysts, is almost never diagnostic of any mineral. Indeed, their *d*-spacing calculation can correspond to ~25% of all common rock-forming minerals, not one specific mineral.

As explained with the analogy using a cube, above, **finding only one *d*-spacing is only rarely diagnostic of any mineral** because minerals are three-dimensional. In the *Diffraction Verification* documents from Drs. Longo and Rigler, each page has a listing at the top that shows **one** of the calculated *d*-spacings for each of the five amphiboles:

Amphibole Type	Pg. #	Card #	Calculated Spacing	Range +/- 5%
Grunerite	449	31-631	5.2	4.94 - 5.46
Actinolite	4	25-157	5.13	4.87 - 5.39
Tremolite	1192	13-437	5.09	4.84 - 5.34
Crocidolite	993	19-1061	5.19	4.93 - 5.45
Anthophyllite	48	9-455	5.28	5.02 - 5.54

These pages then go on to provide a single “Calculated Spacing Å.” For example, there are 31 pages of patterns for sample M69757, for which only **one** *d*-spacing has been calculated. No zone axis information is presented.

The problem here is that providing a single *d*-spacing is not diagnostic of any specific mineral species, or even mineral group. A search of the mineral database⁵⁹ from Dyar and Gunter (2008) shows **that 93 out of 369 (25%) mineral species have at least one *d*-spacing of 4.94 to 5.46 Å**. A more comprehensive analysis using the American Mineralogist Crystal Structure database shows **more than one thousand** crystal structures that have at least one *d*-spacing in the range above.⁶⁰ Finally, a search was made of the Inorganic Crystal Structure Database,⁶¹ which contains 203,830 inorganic crystal structures (minerals and chemical compounds). In that database, 8%, 7%, and 6% of the structures had *a*, *b*, or *c*, respectively in the range of 4.94 to 5.46 Å. Some of these are shown below in **Table 2**, where it is apparent that many different minerals, many of which are not amphiboles, have a unit cell dimension of 5.3 Å in some direction. Therefore, deriving a 5.3 Å spacing from an SAED pattern would be completely inconclusive. **A single unit cell dimension (*d*-spacing) is almost never diagnostic enough to uniquely identify a mineral species.**

⁵⁹ The Mineral Database search engine and database, which is sold on the Apple web site at <https://itunes.apple.com/us/app/mineral-database/id815681529?mt=12>, was designed to allow searches on a database consisting only of common rock-forming minerals. The list of minerals with at least one *d*-spacing of 4.94 to 5.46 Å includes (in addition to the minerals listed in **Table 2**) such common minerals as aragonite, calcite, hematite, ilmenite, biotite and phlogopite mica, pyrite and quartz.

⁶⁰ The database is found at <http://rruff.geo.arizona.edu/AMS/amcsd.php>, for minerals under Cell Parameter and Symmetry. Searching each of the *a*, *b* and *c* axes for *d*-spacing between 4.94 and 5.46 Å produces 1897 records, 1227 records, and 2245 records, respectively. Note that these are individual crystal structure refinements, and multiple examples of different mineral species are included.

⁶¹ <https://ucsd.libguides.com/crystallography/icsd>

Table 2. Unit Cell Dimensions for Selected Relevant Mineral Species

Mineral	Formula	a (Å)	b (Å)	c (Å)
enstatite	MgSiO ₃	18.2	8.8	5.2
anthophyllite	Mg ₇ Si ₈ O ₂₂ (OH) ₂	18.5	18.0	5.3
magnesiocummingtonite	Mg ₇ Si ₈ O ₂₂ (OH) ₂	9.5	18.2	5.3
sepiolite	Mg ₄ Si ₆ O ₁₅ (OH) ₂ ·6H ₂ O	13.5	26.7	5.2
antigorite	Mg ₃ Si ₂ O ₅ (OH) ₄	5.3	9.5	14.9
talc	Mg ₃ Si ₄ O ₁₀ (OH) ₂	5.3	9.5	18.9
tremolite	Ca ₂ Mg ₅ Si ₈ O ₂₂ (OH) ₂	9.8	18.1	5.3
actinolite	Ca ₂ (Mg,Fe) ₅ Si ₈ O ₂₂ (OH) ₂	9.8	18.1	5.3
ferrowinchite	CaNaFe ²⁺ ₄ (Al,Fe ³⁺)Si ₈ O ₂₂ (OH) ₂	9.8	18.1	5.3
richterite	Na(CaNa)Mg ₅ Si ₈ O ₂₂ (OH) ₂	10.3	18.4	5.2
ferrorichterite	Na(CaNa)Fe ²⁺ ₅ Si ₈ O ₂₂ (OH) ₂	10.0	18.2	5.3
riebeckite	Na ₂ Fe ²⁺ ₃ Fe ³⁺ ₂ Si ₈ O ₂₂ (OH) ₂	9.8	18.0	5.3
magnesioriebeckite	Na ₂ Mg ₃ Fe ³⁺ ₂ Si ₈ O ₂₂ (OH) ₂	9.8	18.0	5.2

In his deposition on February 6, 2019, Dr. Rigler acknowledged this problem. When asked, “Can you distinguish anthophyllite from cummingtonite with SAED alone?”, Dr. Rigler acknowledged that “you’d have to do zone axis in a couple of different zones to tell.”⁶² In his deposition, Dr. Longo confirmed this statement, saying that identification of anthophyllite requires measuring both “*d*-spacing and a second pattern from a different crystalline orientation.”⁶³ Despite this acknowledgment, Drs. Longo and Rigler only report two zone axes for a single anthophyllite grain,⁶⁴ and give a single zone axis measurement for only two other samples (M69042-008 and M68503-001).

The testimony of Drs. Longo and Rigler confirms that their methodology does not identify specific minerals.⁶⁵

⁶² 2/6/19 Rigler Depo. 108:23-109:18.

⁶³ 2/5/19 Longo Depo. 133:3-9.

⁶⁴ These zone axes are provided in the *Diffraction Verification* documents. Several values of *d*(hk0), *d*(hkl), and θ are given for sample M69757-007, but no zone axis is derived. For sample M69042-002, several values are given for sample *d*(hk0) only. For sample M68233, four different zone axes are presented; this is the only sample for which more than one zone axis is given.

⁶⁵ 2/5/19 Longo Depo. 157:3-8 (“Q. Okay. What other amphibole in the Mineral Powder Diffraction File have *d*-spacing ranges that span 5.23? A. Most of your amphibole minerals, both monoclinic and orthorhombic, will have *d*-spacings in this range.”); 2/6/19 Rigler Depo. 119:3-8 (“Q. Now, for this verification page, you calculated a *d*-spacing of 5.23; correct? A. Correct. Q. And that falls within the range of every single amphibole on that list; right? A. Correct.”); *see also id.* 119:22-120:8.

F. Unfeasible *d*-Spacings In Longo/Rigler *Diffraction Verification* Documents

Summary: Some of the Longo/Rigler *d*-spacing interpretations have impossible values.

Lack of understanding of *d*-spacings is also shown by reports of indefensible *d*-spacings. Page 14 of the M69757 *Diffraction Verification* document demonstrates particularly poor methodology:

VERIFICATION OF AMPHIBOLE DIFFRACTION PATTERN AT ZERO TILT		
Camera K (pixel/Å)	Meas. Distance (pixels)	Calculate Spacing (Å)
810.7	411.6	1.97

Streaking Observed: _____ Closely spaced dots: _____

Type of amphibole diffraction verified: Anthophyllite

MAS Job #: M69757-007-001 Film #: NA

Analyst: JC Date of Photo: 12/15/2018

Date Verified: 12/18/2018 EDS Verified: YES

Zone Axis Information

d(hk0) = 10.1
 d(hkl) = 1.97
 Angle = 83
 ZA =

Under the heading “Zone Axis Information,” the *d*(hk0) value is indicated to be 10.1 Å. A user would then look for this value in the look-up tables. But as seen on the first page of the anthophyllite reference sheet shown below, **there are no (hk0) values higher than 9.25 Å.**

ANTHOPHYLLITE

d-Spacing (Å) and Interfacial Angle θ (°)

Page 1 of 32

(JCPDS 9-455: *a* 18.5Å *b* 17.9Å *c* 5.28Å α 90° β 90° γ 90°, Orthorhombic)

[Space Group *Pnma* permits only $h=2n$ diffractions for (hk0) and $(k+l)=2n$ for (0kl)]

Zone Axis	(h k 0)	(h k l)	<i>d</i> (hk0)	<i>d</i> (hkl)	(hk0)/(hkl)	θ	To C-Axis(°)
[0 1 0]	(2 0 0)	(1 0 1)	9.25	5.08	1.82	74.1	90.0
[0 1 1]	(2 0 0)	(0 1 1)	9.25	5.06	1.83	90.0	73.6
[0 1 1]	(2 0 0)	(1 1 1)	9.25	4.88	1.89	74.7	73.6
[0 1 0]	(2 0 0)	(2 0 1)	9.25	4.59	2.02	60.3	90.0
[0 1 1]	(2 0 0)	(2 1 1)	9.25	4.44	2.08	61.3	73.6
[0 1 2]	(2 0 0)	(1 2 1)	9.25	4.42	2.09	76.2	59.5
[0 1 2]	(2 0 0)	(2 2 1)	9.25	4.08	2.27	63.8	59.5
[0 1 0]	(2 0 0)	(3 0 1)	9.25	4.01	2.31	49.4	90.0
[0 1 1]	(2 0 0)	(3 1 1)	9.25	3.91	2.36	50.6	73.6
[0 1 2]	(2 0 0)	(3 2 1)	9.25	3.66	2.53	53.6	59.5
[0 1 0]	(2 0 0)	(4 0 1)	9.25	3.48	2.66	41.2	90.0
[0 1 1]	(2 0 0)	(4 1 1)	9.25	3.42	2.71	42.4	73.6
[0 1 2]	(2 0 0)	(4 2 1)	9.25	3.24	2.85	45.5	59.5
[0 1 0 1]	(2 0 0)	(1 0 2)	9.25	2.61	3.54	81.9	90.0

A second sample, M69042-008 particle 37, lists a *d*-spacing of 13.46. In these cases, **either the measurement itself is bad or these cannot be anthophyllite, or both.**

In addition, many of the other *d*-spacings calculated in the *Diffraction Verification* documents lie outside their own stated ranges for amphiboles: M69757-005 particle 23; M69757-007 particles 30 and 31, M6942-002 particles 12, 15, 16, 19, 20, 22; M68503-001 particle 7, M68503-002 particle 10, M68503-026 particles 35, 57, and 58. In some cases, the values are likely for (hkl), which also has a wide range of values at $1.7 \pm 5\%$ Å. But in most of these examples, the stated *d*-spacings are just anomalous and likely incorrect for any of the asbestiform amphiboles.

G. The *d*-Spacing For What Drs. Longo And Rigler Identify As Anthophyllite Actually Corresponds To One Of Two Other Minerals

Summary: The *d*-spacing for “anthophyllite” identified by the Longo/Rigler MDL Reports actually corresponds to cummingtonite or grunerite.

In a small number of instances,⁶⁶ the Longo/Rigler MDL Reports identify the zone axis. For example, because the M68233-001-001 pattern in **Figure 17** was assumed to be anthophyllite (as indicated by the label on the image on page 693), the anthophyllite look-up table⁶⁷ was employed. Part of the relevant page from that look-up table is given below.

⁶⁶ Zone axes are identified in 41 particles from only 6 of the 70 samples in the Longo/Rigler MDL reports.

⁶⁷ Look-up tables were created by Su (2003) *How to Use the d-Spacing/Interfacial Angle Tables to Index Zone-Axis Patterns of Amphibole Asbestos Minerals Obtained by Selected Area Electron Diffraction in Transmission Electron Microscope*, 2008 report, Asbestos Analysis Consulting.

ANTHOPHYLLITE**d-Spacing (Å) and Interfacial Angle θ (°)**

Page 3 of 32

(JCPDS 9-455: *a* 18.5Å *b* 17.9Å *c* 5.28Å α 90° β 90° γ 90°, Orthorhombic)[Space Group *Pnma* permits only $h=2n$ diffractions for (hk0) and $(k+l)=2n$ for (0kl)]

Zone Axis	(h k 0)	(h k l)	<i>d</i> (hk0)	<i>d</i> (hkl)	(hk0)/(hkl)	θ	To C-Axis(°)
[1 0 2]	(0 2 0)	(4 5 2)	8.95	1.93	4.64	57.4	60.3
[2 0 3]	(0 2 0)	(3 6 2)	8.95	1.88	4.75	50.9	66.8
[2 0 1]	(0 2 0)	(1 7 2)	8.95	1.83	4.90	44.4	81.9
[1 0 1]	(0 2 0)	(2 7 2)	8.95	1.80	4.97	45.2	74.1
[2 0 3]	(0 2 0)	(3 7 2)	8.95	1.76	5.08	46.5	66.8
[3 0 1]	(0 2 0)	(1 0 3)	8.95	1.75	5.11	90.0	84.6
[1 0 0]	(0 2 0)	(0 1 3)	8.95	1.75	5.11	84.4	90.0
[3 0 1]	(0 2 0)	(1 1 3)	8.95	1.74	5.13	84.4	84.6
[3 0 2]	(0 2 0)	(2 0 3)	8.95	1.73	5.18	90.0	79.2
[3 0 2]	(0 2 0)	(2 1 3)	8.95	1.72	5.20	84.5	79.2

There is no listing specifically for $d(hk0) = 8.95$, $d(hkl) = 1.77$, $(hk0)/(hkl) = 5.07$, and $\theta = 85.5^\circ$. Therefore, the analyst chooses something close, as highlighted in yellow. Importantly, the **85.5° is not the same as 90°**, as can be plainly seen in **Figure 17**. This indicates that the SAED pattern is NOT a match to anthophyllite, but likely from a different amphibole. Either the analyst mis-read the table or she/he used the angle relative to the *c*-axis instead of to θ . In either case, the methodology and the science are incorrect.

There are many amphibole minerals with similar compositions (**Table 1**). If a SAED pattern is not consistent with anthophyllite, then another amphibole file can be tried, such as that for the grunerite⁶⁸ mineral series, as given below. The yellow highlights in this table represent a good match to the M68233-001-001 SAED pattern. The $d(hkl)$ and the angle are exact matches, suggesting that this mineral is from the cummingtonite-grunerite series. A different amphibole might give an even better match, but **there are no other look-up tables**.

This reliance on look-up tables that only exist for asbestiform mineral species virtually guarantees that an asbestos mineral will be identified. This is a serious flaw in methodology.

⁶⁸ Minerals in the cummingtonite-grunerite series all have very nearly the same crystal structure (with slight variations due to the size difference between Mg^{2+} and Fe^{2+}), and thus share the same look-up table. These minerals have a very different structure from anthophyllite even though the formulas are similar. So the failure by Drs. Longo and Rigler's analysts to use the proper look-up table is an egregious error.

GRUNERITE

d-Spacing (Å) and Interfacial Angle θ (°)

Page 1 of 23

(JCPDS 19-1601: a 9.562Å b 18.380Å c 5.338Å α 90° β 101.86° γ 90°, Monoclinic)

[Space Group C2/m permits only (h+k)=2n diffractions]

Zone Axis	(h k 0)	(h k l)	d(hk0)	d(hkl)	(hk0)/(hkl)	θ	To C-Axis(°)
[2 0 -1]	(0 2 0)	(1 -5 2)	9.190	2.005	4.58	57.0	116.3
[1 0 0]	(0 2 0)	(0 6 2)	9.190	1.988	4.62	49.5	101.9
[2 0 3]	(0 2 0)	(3 5 -2)	9.190	1.914	4.80	58.6	57.2
[1 0 -1]	(0 2 0)	(2 4 2)	9.190	1.913	4.80	65.4	128.0
[1 0 2]	(0 2 0)	(4 -2 -2)	9.190	1.911	4.81	78.0	47.1
[3 0 1]	(0 2 0)	(1 1 -3)	9.190	1.771	5.19	84.5	91.1
[2 0 -1]	(0 2 0)	(1 -7 2)	9.190	1.768	5.20	47.7	116.3
[3 0 2]	(0 2 0)	(2 0 -3)	9.190	1.754	5.24	90.0	80.3
[3 0 2 1]	(0 2 0)	(2 -2 -3)	9.190	1.723	5.33	79.2	80.3

This analysis shows that the analysts used by Drs. Longo and Rigler and their analysts incorrectly used the anthophyllite table to identify the zone axis in a particle that was likely from the cummingtonite/grunerite series. The same mismatch can be observed for all the values of $d(hk0)$, $d(hkl)$, and the interfacial angle θ compiled for anthophyllite in the report on sample M68233 entitled *Diffraction Verification*.

H. Drs. Longo And Rigler And Their Analysts Do Not Follow EPA Methodology, Including Confirmation On At Least Two Zone Axes

Summary: The EPA “Yamate III” methodology for confirming the presence of asbestos in talc requires *two* SAED zone axis determinations and an EDS analysis, which the Longo/Rigler MDL Reports do not provide.

The protocol for “Methodology for the Measurement of Airborne Asbestos by Electron Microscopy” (Yamate, EPA, 1984) states in Section 2, “Conclusions and Recommendations” (p. 3) that there are three necessary levels of effort:

The EM methodology for measuring the concentration of airborne asbestos fibers has been refined and specified, and is recommended for field evaluation. The methodology is based on a TEM analytical protocol that is divided into three levels of effort: Level I, for screening many samples; Level II, for regulatory action; and Level III, for confirmatory analysis of controversial samples. The three-level analytical methodology is cost-effective, and will provide the required results for proper assessment of asbestos.

Level III is used in these cases (Section 6, Level III Asbestos Analysis, Discussion of Protocol, from p. 44):

The Level III protocol is an extension of the Level II analysis procedures described in Section 5. This extension may be necessitated by the need for positive identification of the specific amphibole species in situations where (1) fundamental disagreements between parties involved in a litigation require further clarification;

(2) for identification purposes, e.g., as causative agents in medical diagnosis or studies; (3) for quality control of Level II analysis in special situations, and/or; (4) for source samples, whether as bulk material or bulk-air type where a legal judgment is anticipated.

The protocol states that identification requires **two** SAED zone axis determinations and an EDS analysis. Dr. Rigler stated in his deposition that anthophyllite particles were double-verified by *d*-spacing analysis (2/6/19 Rigler Depo. 125:18-20). But out of **hundreds of particles** studied by Drs. Longo and Rigler (or their analysts), zone axis determinations are provided for only 41 particles in **six** samples. In fact, zone axis information is provided for only **one** “anthophyllite,” M68233.⁶⁹ **As such, Drs. Longo and Rigler and their analysts do not follow EPA protocol.**

Indeed, both Dr. Rigler and Dr. Longo admit to problems inherent in using too few zone axis, despite doing it themselves.

I. Conclusions Relating to SAED Analysis

- **SAED images in the Longo/Rigler MDL Reports are often of very low quality with poor documentation.** Some of them are uninterpretable. The reports do not provide the calibration constant needed to convert dot spacings into atom spacings.
- **Indexing of diffraction patterns using look-up tables is done incorrectly.** The use of asbestos mineral species’ look-up tables to determine zone axes presumes that the mineral species of the sample has already been identified. Even lacking such information, Drs. Longo and Rigler and their analysts consistently use the anthophyllite look-up table, and do not consider whether another mineral species might give a better match. “Anthophyllite” diffraction patterns indexed by Drs. Longo and Rigler do not match those in look-up tables for that mineral.
- **Unfeasible *d*-spacings exist in the Longo/Rigler *Diffraction Verification* documents.** In two of the 41 cases for which zone axis information is provided, the calculated *d*-spacing is impossible. In several other cases, the single *d*-spacing lies outside the stated range for amphibole minerals.
- **Drs. Longo and Rigler and their analysts do not follow EPA methodology for “confirmatory analysis of controversial samples.”** Although Drs. Longo and Rigler both admitted in deposition that two zone axis determinations are necessary to confirm the identity of anthophyllite, zone axis data are provided for only 41 particles in six samples, and the requisite two zone axes on the same sample aliquot are given for only three samples.

⁶⁹ Although Drs. Longo and Rigler (or their analysts) believe this particle to be anthophyllite, it is actually a mineral in the cummingtonite-grunerite series.

- **Even when patterns are correctly acquired, the same mineral will have very different SAED patterns depending on its orientation.**
- **SAED patterns alone cannot determine the morphology of a mineral particle.** Even if an SAED pattern can be matched with a specific mineral and orientation, this only identifies which mineral species is present. Such analysis cannot determine whether or not the mineral is asbestiform.

VI. MINERAL IDENTIFICATION USING PLM

The Longo/Rigler MDL Reports purport to use polarizing light microscopy (“PLM”) to identify asbestos in talc. This section discusses the proper use of PLM, as compared to how it was used in plaintiffs’ experts’ reports.

A. How PLM Works

Summary: PLM, when properly used, can identify asbestos mineral content by observing the morphology and refractive indices of the particles in the sample.

PLM is a technique that uses a specially-equipped microscope to polarize the beams of light that pass through a sample (**Figure 18**). This “polarization” causes all the waves of light to vibrate in the same direction, creating a set of near-parallel light waves. When a sample is rotated on the microscope stage, the parallel waves of light interact with the sample differently depending on the angle between the layers of atoms in the sample and their spacings.

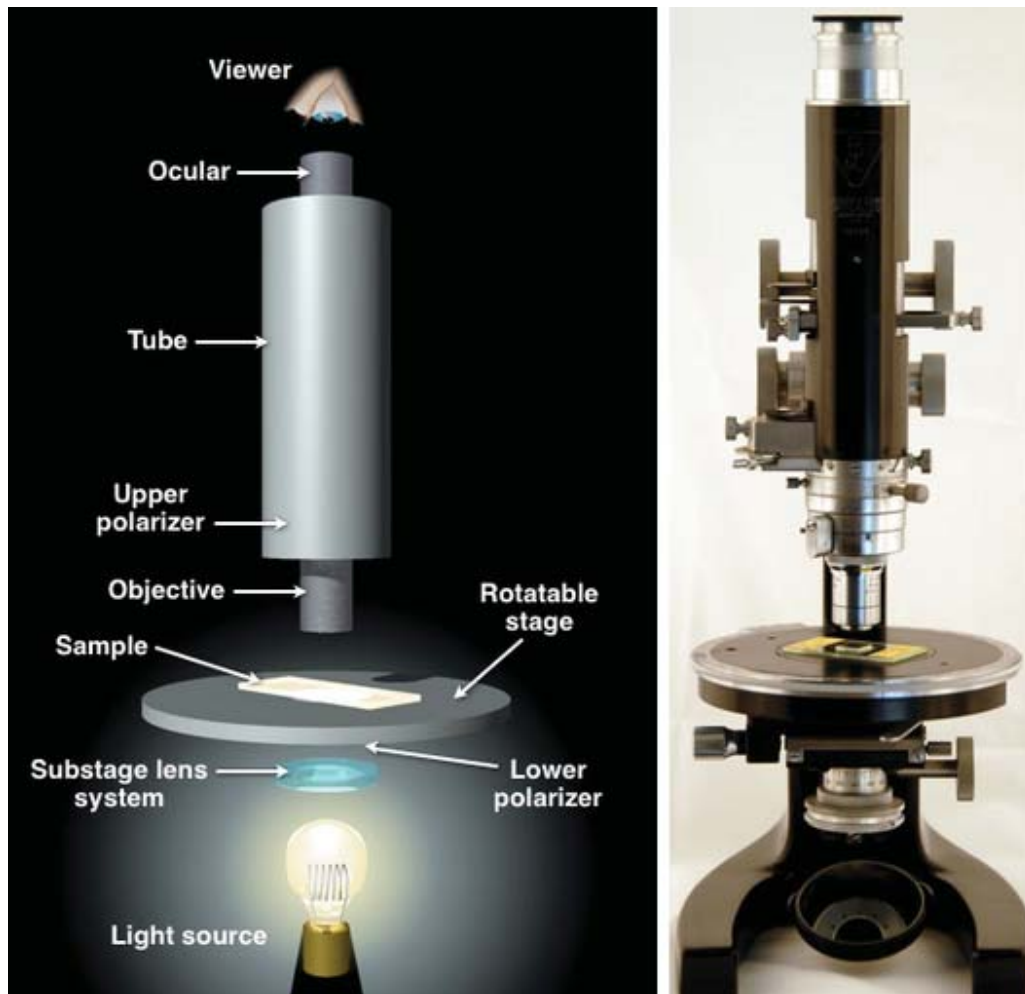


Figure 18. Photograph and sketch of a simple polarizing light microscope, from Dyar and Gunter (2008), Figure 17.2.

The polarizers above and below the microscope stage allow a user to study how parallel waves of light interact with rows of atoms in a crystal structure. Changes in appearance upon rotation can be diagnostic of specific mineral groups and, sometimes, mineral species.

The PLM method is, by Longo's own admission, "primarily used today for the analysis of asbestos-added products where the asbestos contents of these products are typically over 1% by weight."⁷⁰ PLM allows mineral species to be identified using inherent properties of each mineral: the shape of the grains, the way they break and their densities.

Drs. Longo and Rigler and analysts examined 61 samples using PLM (ISO 22262-1 method), which requires that asbestos be identified using six types of observations:

- Morphology
- Color and pleochroism
- Birefringence
- Extinction characteristics
- Sign of elongation
- Refractive index

The last property, refractive index (R.I.), is a ratio between the speed of light traveling through a vacuum and how fast it travels through (in this case) a mineral. The value of n is different in varying directions of a mineral, and so the change in refractive index with orientation can be diagnostic of a mineral group or species.

To measure the value of n in an unknown grain, it is surrounded by an oil with a known n , and the crystal is examined. For example, in the protocol used by Drs. Longo and Rigler, "three mounts of the talcum powder samples are placed on two glass slides, a drop of the 1.605 refractive index fluid was placed on each of the three . . . mounts, stirred with the point of a scalpel blade, and then covered with . . . [a] glass cover slip."⁷¹ This procedure is shown in **Figure 19**. In this method, grains with exactly the same n will be invisible, while grains with higher or lower values of n will appear to have positive or negative relief.

[**Figure 19** on next page.]

⁷⁰ 2/1/19 MDL Report, page 5.

⁷¹ 2/1/19 Longo/Rigler MDL Report, page 10.

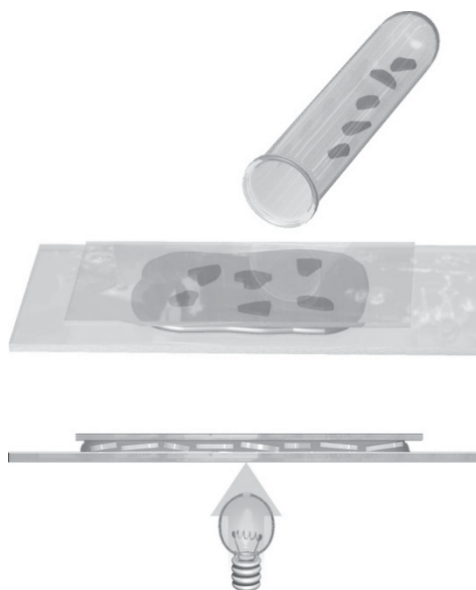


Figure 19. For microscopy using refractive index oils, grains of mineral are placed on a microscope slide surrounded by a liquid with a refractive index matching the mineral. From Dyar and Gunter (2008), Figure 17.6.

In the technique called “dispersion staining” used by Drs. Longo and Rigler, a special 10× objective is used on the microscope to cause dispersion of light waves and create certain specific colors. The colors become more red, orange and yellow when $n_{\text{mineral}} > n_{\text{oil}}$, and more like indigo, purple and turquoise when $n_{\text{mineral}} < n_{\text{oil}}$. The color will change when the microscope stage is rotated because the densities of atoms are different along different planes in each crystal’s structure.

The problems that arise from the optical images and their interpretation are similar to those of SAED. It is difficult to distinguish minerals with very similar structures (e.g., tremolite and actinolite) because the spacings of layers of atoms and the compositions are identical or very similar. As a result, many of the minerals from **Table 1**, as well as many other amphibole group minerals, will have overlapping optical characteristics that can make them difficult to distinguish from one another, rendering any optical analyses (even PLM, even using dispersion staining) inconclusive.

Consider, for example, the list of mineral refractive indices at this url: <https://nature.berkeley.edu/classes/eps2/wisc/ri.html>, or the extensive list of Shannon et al. (2017).⁷² A survey of the Berkeley list shows that 87 of the 204 mineral species (43%) listed there have at least one refractive index that falls in the range of $n = 1.55$ -1.65. Careful PLM work requires that refractive indices be obtained at different orientations (preferably using a range of oils to pinpoint the value of n at each orientation) to refine the identification. It may be necessary in geological studies to corroborate microscope mineral identifications using chemical data obtained by a high-accuracy method.

⁷² Shannon et al. (2017) Refractive indices of minerals and synthetic compounds. *Amer. Mineral.*, **102**, 1906-1914. The refractive index table is available under the listing for page 1906 on this url: http://www.minsocam.org/MSA/AmMin/TOC/2017/Sep2017_data/Sep2017_data.html.

B. All Of The ISO PLM Tests Returned Results Consistent With A Finding Of No Asbestos

There are three sources of ISO PLM data: (1) results from the analysts working for Drs. Longo and Rigler; (2) results from the J3 laboratory that are reported in the Longo/Rigler MDL Reports; and (3) results from the J3 laboratory that (for some unknown reason) are not reported in the Longo/Rigler MDL Reports. The Longo/Rigler MDL Reports do not synthesize these data in one place. Notwithstanding that issue, the results appear to be as follows:

- All the reported ISO PLM test results – whether from Drs. Longo and Rigler’s laboratory or the J3 laboratory – were either “no asbestos detected” or less than 0.1% by weight asbestos detected, which is consistent with detecting no asbestos.
- Of the at least 39 bottles tested by J3 using ISO PLM, the result of each was “no asbestos detected.”⁷³
- There are at least eight instances of, for a single bottle, J3 finding “no asbestos detected,” while Drs. Longo and Rigler’s analysts found “< 0.1% by weight” of asbestos by ISO PLM,⁷⁴ as follows:

MDL SAMPLE	LONGO/RIGLER ISO PLM RESULT (wt%)	J3 RESOURCES ISO PLM RESULT (wt%)
M68503-004	< 0.1 Trem/Act	No asbestos detected
M68503-026	< 0.1 Trem/Act	No asbestos detected
M68503-023	< 0.1 Anth	No asbestos detected
M68503-042	< 0.1 Trem/Act, < 0.1 Anth	No asbestos detected
M68503-057	< 0.1 Trem/Act, < 0.1 Anth	No asbestos detected
M68503-020	< 0.1 Anth	No asbestos detected
M68503-059	< 0.1 Trem/Act, < 0.1 Anth	No asbestos detected

Thus, in summary, **all** the ISO PLM testing was consistent with the **absence of asbestos** in the samples.

Moreover, there are also 10 instances where the Longo/Rigler reports identify concentrations of asbestos by the “Blount PLM” method that, if correct, are well above the sensitivity limits of ISO PLM. Thus, **all** such “positives” should have registered as positives on the ISO PLM. Yet here are the results, comparing these 10 instances to the results from the PLM testing at J3:

⁷³ These are Nos. M68503-010, M68503-009, M68503-024, M68503-004, M68503-014, M68503-011, M68503-027, M68503-019, M68503-038, M68503-026, M68503-005, M68503-029, M68503-021, M68503-023, M68503-028, 02D, M68503-046, M68503-042, M68503-057, M68503-020, 07D, 15D, 50D, M68503-059, 10D, 38D, 63D, 52D, 65D, 37D, 45D, 51D, 66D, 21D, M68503-001, 31F, 31G, M68503-016 and M68503-01.

⁷⁴ These are Nos. M68503-004, M68503-026, M68503-023, M68503-042, M68503-057, M68503-020, M68503-059 and M68503-001.

LONGO/RIGLER SAMPLE	LONGO/RIGLER BLOUNT PLM RESULT (wt%)	J3 RESOURCES ISO PLM RESULT (wt%)
O7D STS	0.2 Trem/Act, 0.5 Anth	No asbestos detected
15D STS	0.3 Trem	No asbestos detected
10D STS	0.2 Trem/Act	No asbestos detected
38D STS	0.2 Trem/Act	No asbestos detected
63D STS	0.2 Trem/Act	No asbestos detected
52D STS	0.2 Trem/Act, 0.5 Anth	No asbestos detected
65D STS	0.2 Trem/Act, 0.2 Anth	No asbestos detected
66 D STS	0.1 Trem/Act	No asbestos detected
31F STS	0.3 Trem/Act, <0.1 Anth	No asbestos detected
31G STS	0.7 Tre/Act	No asbestos detected

Thus, even where the Longo/Rigler Blount PLM testing result purportedly was seven times the sensitivity reported for the ISO PLM testing, it did not register on the latter. This represents a gross inconsistency, and suggests issues with the PLM work at either or both of Longo/Rigler's laboratory and J3. These results show that the PLM work in the Longo/Rigler MDL Reports does not appear to be reproducible.

C. Dispersion Staining Was Not Used Correctly

The Longo/Rigler MDL Reports purport to find asbestos using dispersion staining, but generally accepted scientific methodologies were not followed. The goal of this methodology is to "meet the requirements set forth by EPA (1993) and NIST (1994) [...in which] analysts must measure and record two principle refractive indices, n_α and n_γ , of every type of asbestos mineral found in bulk samples"⁷⁵

The protocol described by the Su article, which Dr. Longo testified that his analysts followed,⁷⁶ sets forth a particular methodology to do the dispersion staining characterization described above. It recommends employing a statistical observation method to determine the refractive index. This involves the following:

"To estimate n_α , analysts randomly select a fiber, rotate it to the extinction position when the fiber elongation axis is nearly parallel (tremolite or actinolite) or exactly parallel (anthophyllite) to the N-S cross hair (assuming the vibration direction of polarizer is E-W) and observe its CSDS color. After 10 to 20 fibers are examined in this way, the fiber with the longest 10 is assumed to exhibit the RI value closest to n_α . To estimate n_γ , 10 to 20 fibers are examined at the extinction position when the fiber elongation axis is nearly parallel (tremolite or actinolite) or exactly parallel (anthophyllite) to

⁷⁵ Su (2003).

⁷⁶ 2/5/19 Longo Depo. 285:9-14.

the E-W cross hair; the fiber with the shortest l_0 is then assumed to exhibit the RI value closest to n_γ .”

There is no indication on any of the PLM outputs in the Longo/Rigler MDL Reports that multiple grains were measured, as recommended in the protocol.

Moreover, **Figure 20** shows an image from the Longo/Rigler MDL Report of a field of talc particles with one amphibole crystal that is a slightly different color than the surrounding talc.

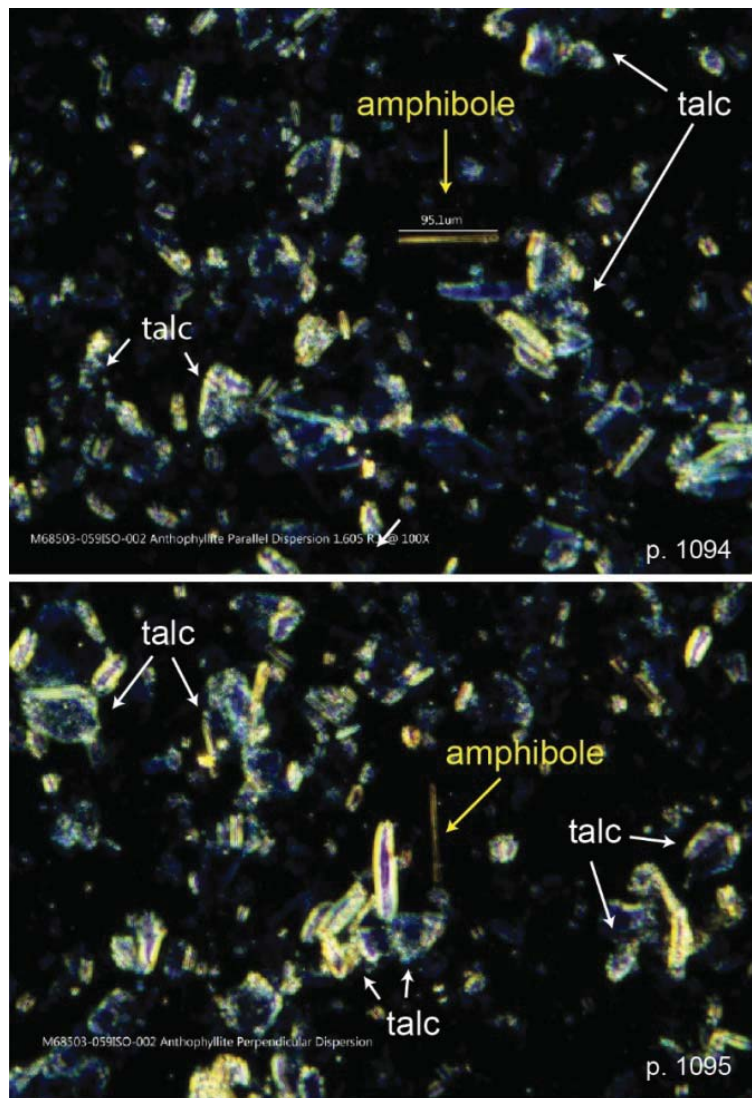


Figure 20. Dispersion staining PLM images showing the same field of view rotated 90°. The change in color of the amphibole grain is diagnostic. Images from pages 1094 and 1095 of the January 2019 Longo/Rigler MDL Report.

Here, the surrounding talc crystals are scattered across the field of view. Some of them appear to have slightly different colors at the edges, but these are likely to be places where the sheets of talc curl up (like chocolate curls). Note that the color variations in these images are very subtle, and it is quite difficult to unequivocally determine if the crystal labelled “amphibole” is

truly a different color than the surrounding grains. This is why the Su (2003) paper recommends looking at many different grains to calculate refractive index correctly.⁷⁷

Another issue is that the dispersion staining images should have used an immersion oil with a refractive index of 1.625 to identify anthophyllite, according to Su (2003) **Table 1**. Instead, the samples were analyzed using a “drop of the 1.605 refractive index fluid.”⁷⁸ The report cites ISO 22262-1 as the source of the choice of 1.605, when in fact, the report states “For identification of tremolite, actinolite, anthophyllite, and richterite/winchite, RI liquids in the range 1.605 to 1.660 are required, at intervals of 0.005.”⁷⁹ There is no evidence in the Longo/Rigler MDL Reports to indicate that such a progression of oils was used.

A second example of a confusing PLM image is given in **Figure 21**.

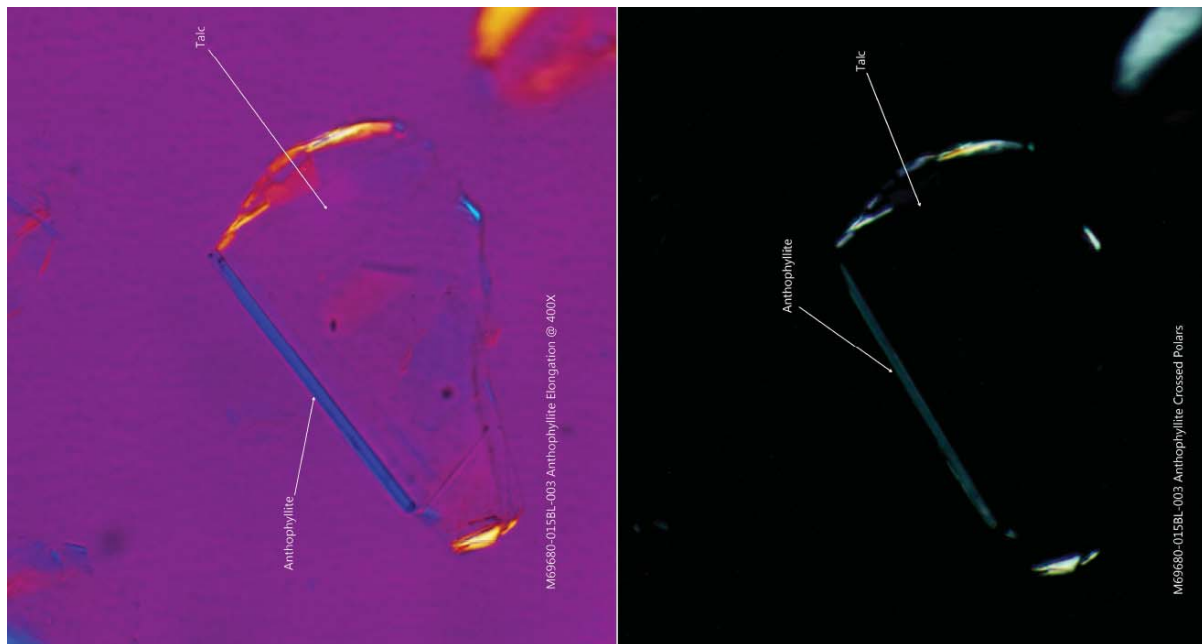


Figure 21. Images of a talc grain with the leftmost edge curled up out of the page.

The curled edge is erroneously identified in the Longo/Rigler MDL Reports as a separate crystal of anthophyllite, but this is highly unlikely. The “anthophyllite” grain would not just “happen” to lie exactly along the edge of the talc grain.

The view at left is pink because it is a dispersion staining image, in which a special wave plate is inserted in the microscope to make the colors more intense (and more diagnostic). These are images of a grain of talc. The straight edge of the talc grain is labeled as “anthophyllite,” but in fact, this is a curled-up edge of the talc grain. Because of the curl, the grain is showing a different orientation within the crystal structure, which has different optical properties, and therefore shows

⁷⁷ Su (2003) at 1980 (“After 10-20 fibers are examined in this way. ...10-20 fibers are examined at the extinction position...”).

⁷⁸ 1/16/19 Longo/Rigler MDL Report, page 9.

⁷⁹ 1/16/19 Longo/Rigler MDL Report, page 15.

up as blue. Very few of the PLM images in the Longo/Rigler MDL Reports have labels. There is little discussion of PLM results in any of the reports.

There is also no mention of utilizing proper protocol for distinguishing between talc and anthophyllite with dispersion staining. As noted in ISO 22262-1:

“Some sources of talc contain fibres that can be mistaken for anthophyllite. These fibres have intergrowths of both the anthophyllite and talc crystal structures. The fibres exhibit refractive indices that are lower than those of anthophyllite and intermediate between those of talc and anthophyllite. If this type of fibre is present, examine the sample in a liquid of RI 1,615. If no γ indices are observed that are higher than 1,615, classify the fibres as talc. Classify any fibres with γ indices equal to or exceeding 1,615 as anthophyllite.”

It does not appear that this protocol was followed.

D. The “Point Counting” Method Was Not Used, Yet It Is The Only Way To Estimate Concentration By PLM, As Recognized By ISO 22262

Summary: The ISO 22262-1 protocol provides a methodology for estimating concentration by PLM using “point counting.” Drs. Longo and Rigler and their analysts did not do this. Instead, their estimates were based on purported charts generated by Drs. Longo and Rigler’s lab’s own methodology that are not accepted by the scientific community and that were not produced.

The standard method for estimating concentrations of minerals in geological materials by PLM is called “point counting.”⁸⁰ In this technique, a sliver of rock or loose particles is placed on an *x-y* stage on a microscope so it can be moved in different directions. The operator then looks down the microscope and uses the technique of choice (usually the optical properties of the minerals as they interact with plane polarized light) to identify the grain at the center of the field of view. Then the stage is moved slightly and the process is repeated. Typically, 100-400 locations on a rock are thus analyzed, from which a quantitative estimate of the abundance of minerals in the rock can be obtained. It is well-recognized that the accuracy of a point count depends on the number of grains counted. This is acknowledged in ISO 22262-1, which says:

“The statistical reliability of a point count for determination of asbestos depends on the number of asbestos points, not on the total non-empty points examined. Accordingly for comparison against a regulatory standard of 0.1 % asbestos by weight, continue point

⁸⁰ An excellent summary of this method is given at <http://geologylearn.blogspot.com/2015/08/point-counting-technique-used-in.html>. See also Neilson and Brockman (1977) *Amer. Mineral.*, **62**, 1238-1244.

counting until either a minimum of 20 asbestos points, or the equivalent of 13,000 non-empty points have been accumulated.”⁸¹

At his deposition, Dr. Longo confirmed that the Longo/Rigler MDL Reports did not use point counting.⁸² Rather, the Longo/Rigler MDL Reports state that “a visual estimation of the quantity of asbestos observed was based on eye calibration through review of lab generated weight percent standards.”⁸³ First off, Drs. Longo and Rigler did not produce those “lab generated weight percent standards,” so there is no evidence that the standards are reliable or based in accepted science. Moreover, given the similarities in color of talc and amphibole in these images, these visual estimates are unreliable and unreproducible. The estimates of abundances are orders of magnitude different from the estimates produced by the TEM measurements due to analytical sensitivity issues, also noted by Drs. Longo and Rigler. Probably for this reason, little attention is paid to the amounts of amphibole observed by the PLM method. Instead, PLM is used in the Longo/Rigler MDL Reports mostly to determine presence/absence of amphibole in asbestos. For example, the January 2019 report notes that 20 of the 61 samples tested “were positive for regulated amphibole asbestos.”⁸⁴

Moreover, it is not clear what these “weight percentage standards” are, as Drs. Longo and Rigler did not produce them. In that sense, their results are unverifiable and unreproducible.

E. Conclusions Relating To PLM Analysis

- **Dispersion staining was not used correctly.** In contrast to the recommended protocol, the Longo/Rigler MDL Reports use only a single refractive index liquid and do not count the requisite number of particles.
- **The Longo/Rigler MDL Reports purport to find asbestos using dispersion staining, but generally accepted scientific methodologies were not followed.** Indeed, it does not appear that the protocol cited was followed.
- **The reported quantities of asbestos based on PLM used “visual estimation” rather than point counting.** Apparently, the estimates were produced by comparisons against unspecified and unregulated “weight percentage standards.” The results are very different from those obtained by TEM, and are mostly ambiguous.
- **Drs. Longo and Rigler and their analysts did not follow the methodology for estimating concentration by PLM using “point counting.”** Instead, their estimates were based on purported charts generated by Drs. Longo and Rigler’s lab’s own methodology that are not accepted by the scientific community and that were not produced.

⁸¹ ISO 22262-1, page 29.

⁸² 2/5/19 Longo Depo. 269: 20-23, 272:15-17.

⁸³ 1/16/19 Longo/Rigler MDL Report, page 9.

⁸⁴ 1/16/19 Longo/Rigler MDL Report, page 7.

VII. MORPHOLOGY IDENTIFICATION USING VISUAL INSPECTION BY TEM

The primary method used in the Longo/Rigler MDL Reports to establish having found asbestiform habit minerals is visual inspection using TEM images. Yet, the methods that they purport to follow expressly state that TEM “cannot be used to discriminate between individual fibers of the asbestos and non-asbestos analogs of the same amphibole material.”⁸⁵

Evaluation of whether a particle is a bundle, fiber or cleavage fragment by visual inspection is highly subjective and subject to personal biases, as will be shown below. This section addresses how the methodologies in the Longo/Rigler MDL Reports for identifying talc are scientifically unacceptable, and that the conclusions reached thereby are unsupportable.

A. Differences Among Fibers, Bundles And Fragments

Summary: There are important morphological differences between asbestiform fibers, asbestiform bundles and non-asbestiform cleavage fragments.

Fibers are described as very thin fibrils, usually less than 0.5 mm in width (*cf.* **Figure 1**), rather than the chunky particles identified in the Longo/Rigler MDL Reports. Fibers are identified on the basis of their curvature, flexibility and high tensile strength. **Figure 22** below shows the visual difference between asbestiform and non-asbestiform versions of the same minerals:

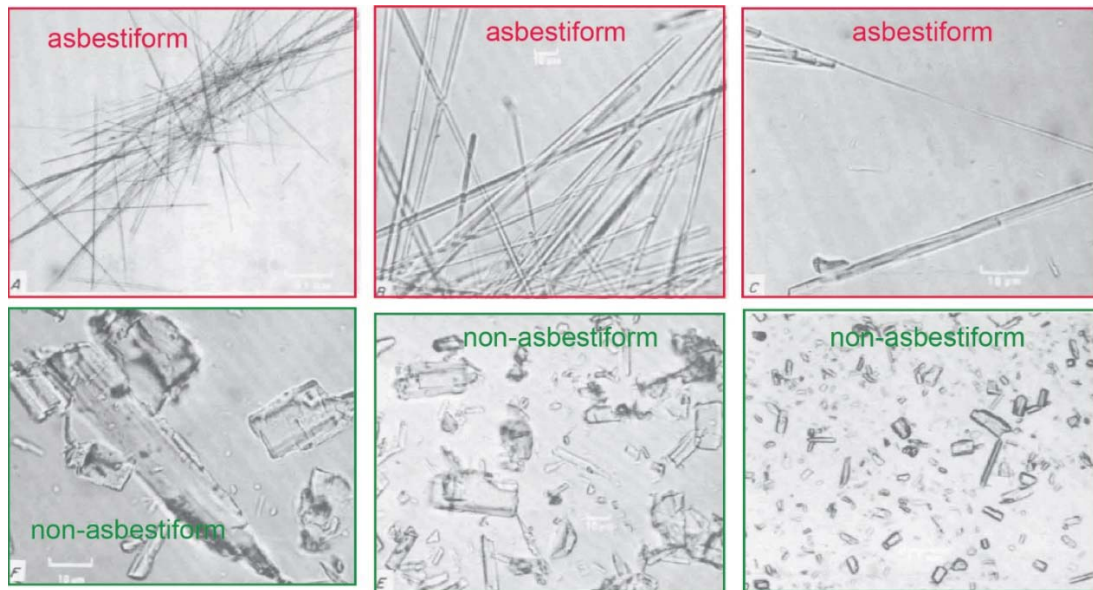


Figure 22. Examples of asbestiform vs. non-asbestiform particles from Figure 39 of the classic paper by Campbell et al. (1977).

The differences between asbestiform and non-asbestiform minerals go back to the first definitions given in this report. Recall that the ISO 22262-1, 2, 3 documents define asbestiform as a “specific type of mineral fibrosity in which the fibres and fibrils possess high tensile strength

⁸⁵ ISO 10312 (1995), at 1; *see* ISO 13794 (1999) (same), at 1; ISO 22262-1 (2012) at 31 (“Full details relating to identification of asbestos fibers using TEM are given in ISO 10312 and ISO 13794.”).

and flexibility.” The particles in the top row of **Figure 22** all seem to comply with this definition. A non-asbestiform particle is often called a cleavage fragment, which means it is a small particle that has broken off a larger crystal. These will appear to be chunkier, as seen in the bottom row of **Figure 22**.

Even if a particle of a mineral that can have an asbestiform habit is long and thin, it may not be an asbestos fiber. Again, that term relates as much to physical properties such as tensile strength and flexibility as it does to aspect ratio. **Figure 23a** shows three examples of fibers that are not “asbestos,” but rather cleavage fragments of non-asbestiform amphibole.

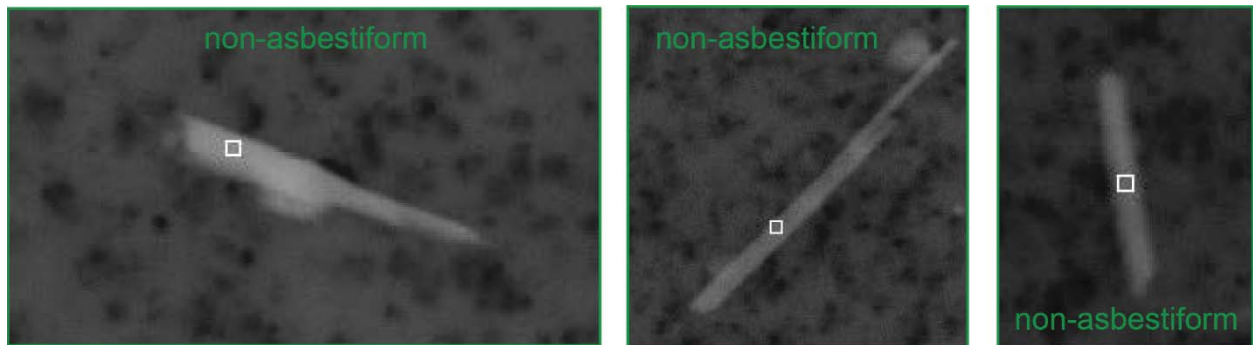


Figure 23a. Images of non-asbestiform particles from Gunter (2010).

Asbestos particles can come in fibers or bundles. Bundles occur as separable groups of parallel fibers with **splayed** ends and matted masses as seen in **Figure 23b**. They are defined in ISO 22262-1 as structures “composed of parallel, smaller diameter fibers attached along their lengths.”

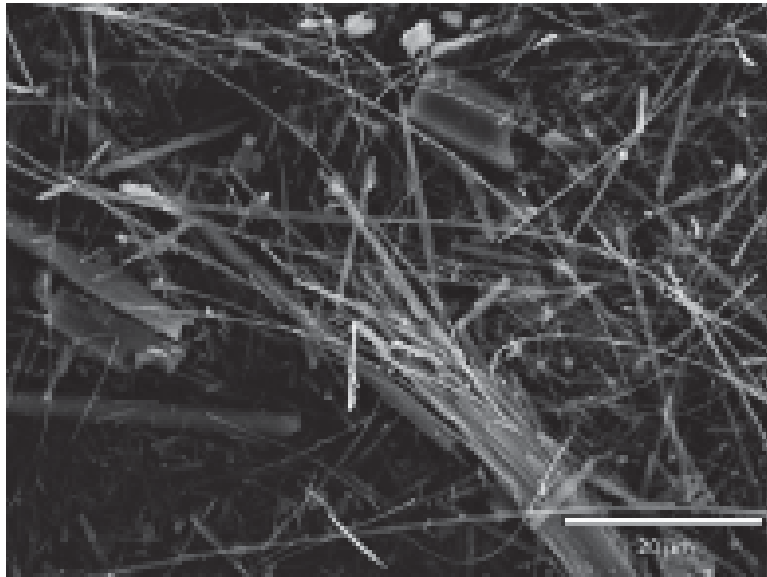


Figure 23b. Image of tremolite bundle of asbestiform particles from Harper et al. (2010).⁸⁶

⁸⁶ Harper et al. (2014) Characterization of Lone Pine, California tremolite asbestos and preparation of research material. *Ann. Occp. Hyg.*, **2014**, 1-13.

The assessment of whether a particle is an asbestiform fiber or bundle versus a cleavage fragment is fairly straightforward. Asbestiform fibers are greatly elongated with high aspect ratios. At the end of a bundle, the fibers generally bend out like the straws at the end of a broom. Note in **Figure 23b** that the particles do splay out at the end, and it is obvious that the bundle at lower right is indeed “composed of parallel, smaller diameter fibers attached along their lengths.”

Alternatively, cleavage fragments tend to be short and fat particles that cannot maintain the thinness and long aspect-ratios associated with asbestiform minerals because they are generally brittle. Non-asbestiform cleavage fragments are blocky, and may show stair-step cleavage fractures on the ends of the grains.

B. Drs. Longo And Rigler Misidentify Cleavage Fragments As Bundles And Fibers

Summary: Drs. Longo and Rigler and their analysts did not apply objective criteria for distinguishing between cleavage fragments, bundles and fibers, as demonstrated by the inconsistent results of their analysts.

The Longo/Rigler MDL Reports consistently demonstrate confusion over the identification of non-asbestiform cleavage fragments vs. the asbestiform habit. For example, the particles shown in **Figure 23c**, which are explicitly identified as fibers and bundles, are effectively identical to the non-asbestiform cleavage fragments in the Longo/Rigler MDL Reports shown in **Figure 23d**.

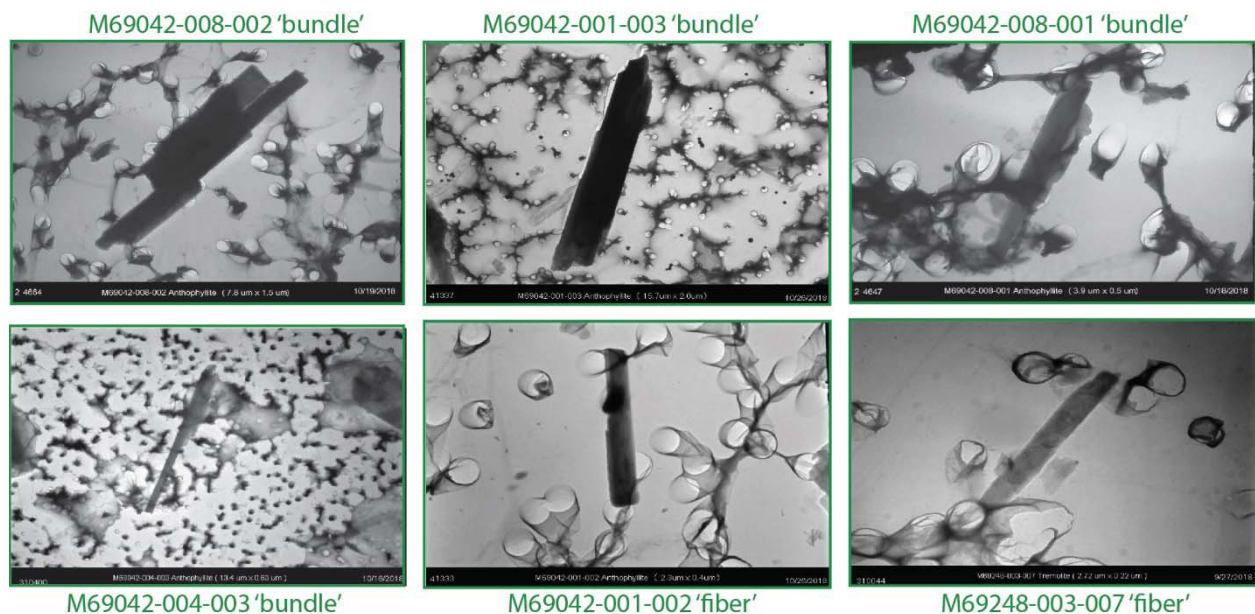


Figure 23c. Particles from the 1/16/19 Longo/Rigler MDL Report and assignments. Compare to **Figures 23a, b** and **c**. This comparison shows visually that the bundles and fibers identified in the Longo/Rigler MDL Report are NOT fibers and bundles, but rather, non-asbestiform particles.



Figure 23d. Dispersion staining photomicrographs from the January 2019 Longo/Rigler MDL report with ambiguous annotations. For sample M69503-010, the PLM ANALYSIS report states the presence of “actinolite/tremolite cleavage fragments” (p. 120).

For sample M69503-026, the PLM ANALYSIS report states the presence of “tremolite/actinolite asbestos observed. Actinolite/Tremolite cleavage fragments observed.”

Compare these images to **Figure 23e**, which shows PLM dispersion staining images of tremolite cleavage fragments from the peer-reviewed paper by Pierce et al. (2017). These dispersion photomicrographs were imaged by RJ Lee Group and Forensic Analytical, Hayward, CA. Particles in **Figures 23e** and **23f** are effectively identical, and here, the analysts employed by Drs. Longo and Rigler correctly identify these particles as cleavage fragments.

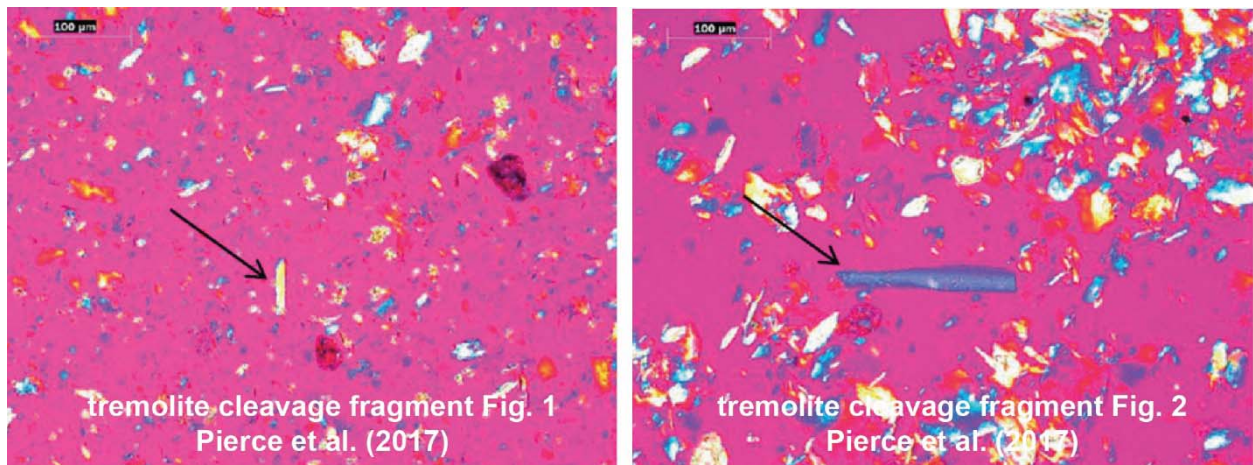


Figure 23e. PLM dispersion staining images of tremolite **non-asbestiform cleavage fragments** from the peer-reviewed paper by Pierce et al. (2017).

But the particles seen in **Figure 23f**, which are strikingly similar, are indicated in the Longo/Rigler MDL Reports to be **asbestiform bundles**, even though they demonstrate none of the objective criteria for such bundles. **They look nothing like the bundle shown in Figure 23c.**

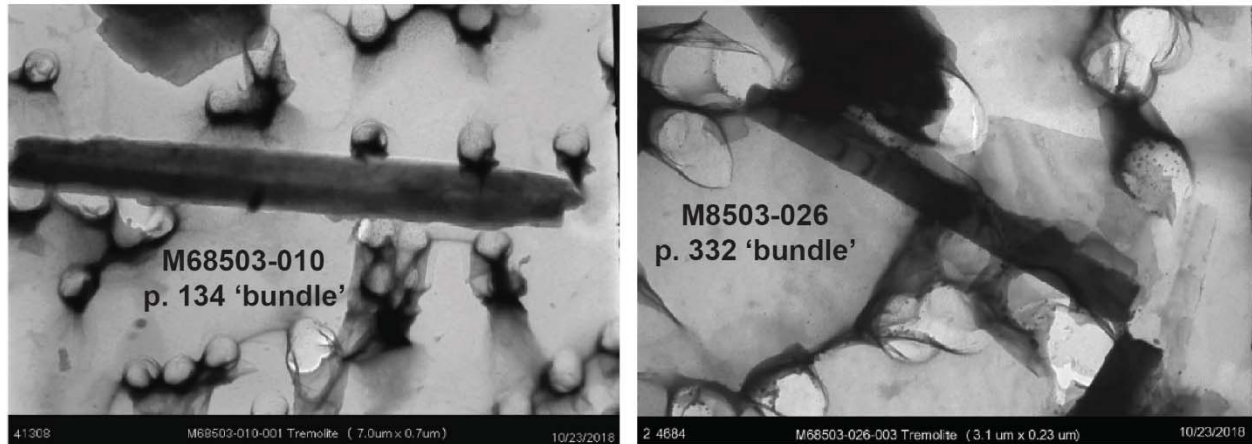


Figure 23f (left) The TEM report for sample M69503-010 (p. 131) identified 4 bundles of tremolite. No mention is made of cleavage fragments (right).

The TEM report for sample M69503-026 (p. 321) identified 31 bundles of tremolite. Note that the shape of the “bundles” identified in the Longo/Rigler TEM images is the same as the shape of the cleavage fragments in Pierce et al. (2017).

There is obvious confusion in the Longo/Rigler MDL Reports over these identifications. Nearly all of the amphiboles referred to as “fibers” and “bundles” in the Longo/Rigler MDL Reports are likely to be either non-asbestiform amphibole cleavage fragments, or in some cases, talc particles viewed on edge.

C. Results Of Analysts Working For Drs. Longo And Rigler Are Inconsistent

Summary: The results reported in the Longo/Rigler MDL Reports are inconsistent from analyst to analyst, highlighting the unreliability of their method of visual identification using TEM.

The inconsistent results of the analysts working for Drs. Longo and Rigler in characterizing fibers and bundles is further proof of the lack of repeatability of the analysis in the Longo/Rigler MDL Reports. Because criteria for describing particle morphology are so ambiguous, it comes as no surprise that different analysts would produce wildly variable results (**Figure 24**). Some analysts, such as Mehrdad Motamedi, are far more likely to classify a particle as a fiber, and Anthony Keaton, for example, finds far more fibers than either Jayme Callan or Lee Poye.

[**Figure 24** on next page.]

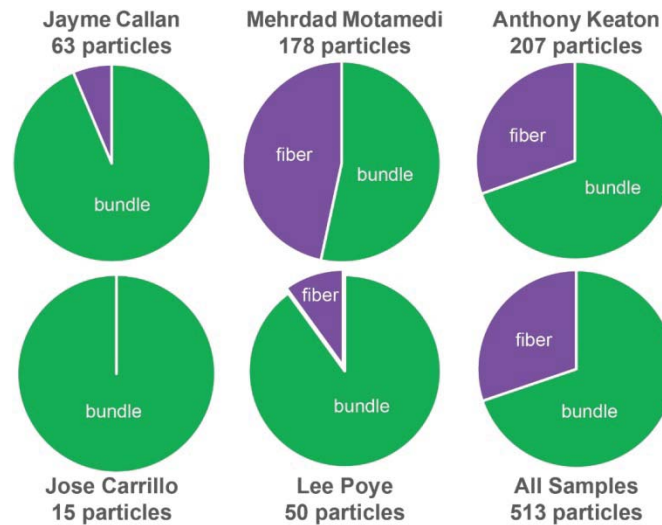


Figure 24. Comparison of fiber vs. bundle identifications made by different analysts. Note that totals are different from those in the mineral identification figures because morphologies were not reported for some particles. Data sources as in **Figure 8**.

Figure 25 shows that the percentage of observed bundles vs. fibers also increases over time. Because the talc samples studied were randomly selected from various collections, such a conclusion is highly unlikely, and simply shows operator bias. This renders the distinctions made in the Longo/Rigler MDL Reports between fibers and bundles arbitrary.

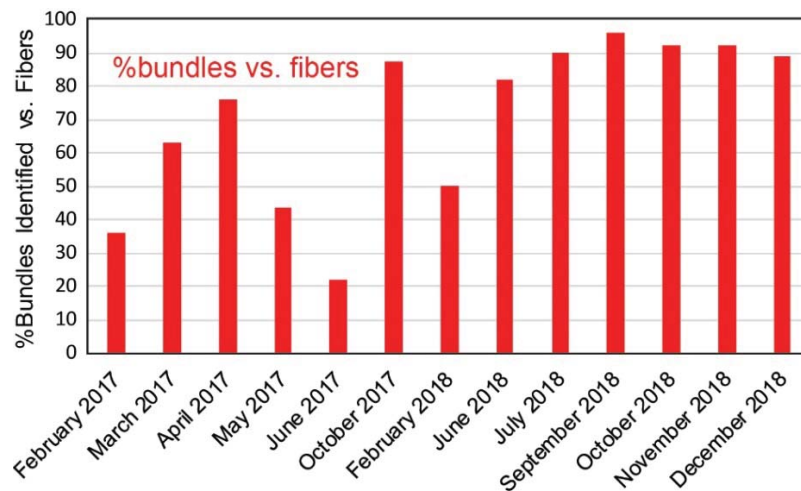


Figure 25. Identifications of bundles vs. fibers over time by analysts working for Drs. Longo and Rigler. Data sources as in **Figure 8**.

Finally, **Figure 26** shows results from a test undertaken to supposedly demonstrate the “Coefficient of Variation” of their analysts.⁸⁷ The stated goal of this document is “to determine the MAS [Longo/Rigler] TEM analysis coefficient of variation (CV or relative standard deviation RSD)” of measurements made on cosmetic talc spiked with asbestos standard reference material. In other words, this testing sought to confirm consistency of results from the company’s testing.

⁸⁷ TEM Coefficient of Variation for Tremolite and Anthophyllite in Talc: A Quality Control Study.

Two TEM grids were studied. Supposed “asbestos” particles were searched for in each of 100 squares in each grid. Then four of the analysts working for Drs. Longo and Rigler were asked to measure the particles and judge if they are fibers or bundles. Each analyst looked at exactly the same particles. The document does calculate the mean and standard deviation of the **number** of particles observed on each sample. Standard deviation in this instance indicates how reproducible the measurement is, but says nothing about accuracy – i.e., how close it is to the true value.

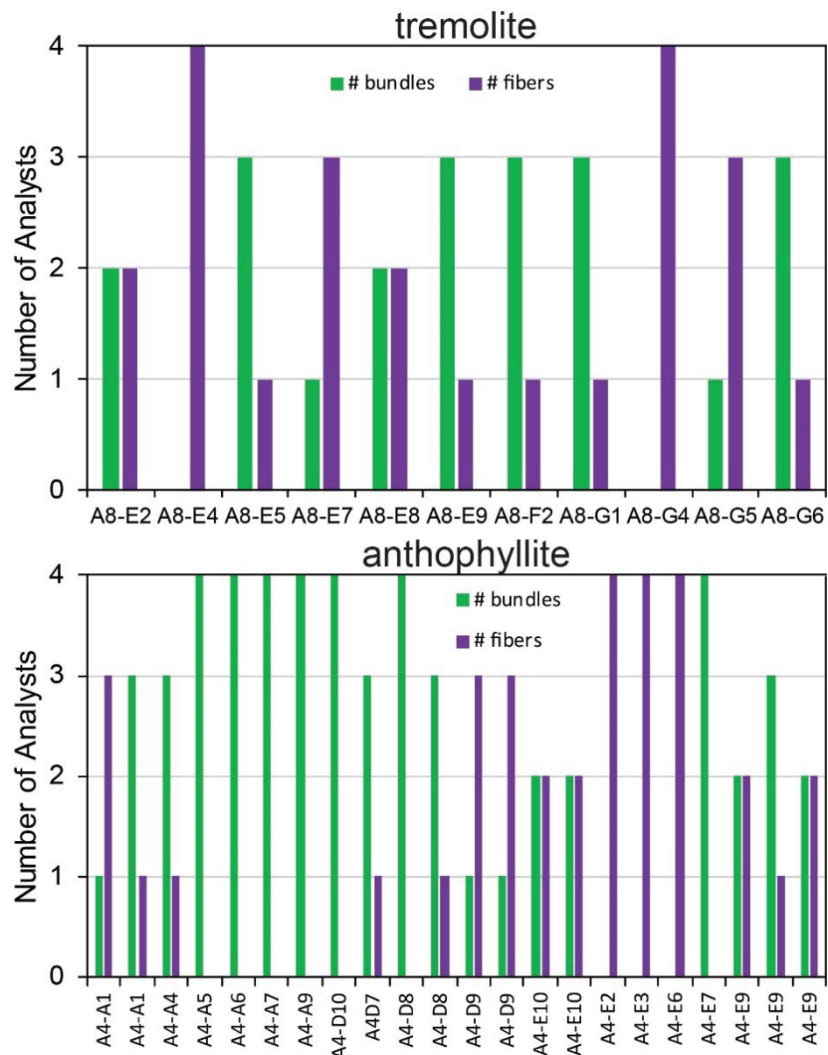


Figure 26. The Longo/Rigler MDL report entitled *TEM Coefficient of Variation for Tremolite and Anthophyllite in Talc: A Quality Control Study* shows results from four different analysts who identified the same particles in the same set of two TEM grids, one for tremolite (top) and one for anthophyllite (bottom). Out of 44 particles, there are only 9 cases in which all four analysts agree on whether a particle is a fiber or a bundle. In other words, they disagree 80% of the time. This represents an unacceptable inconsistency and reveals the arbitrary nature of these judgments.

But the document also shows the alarming inconsistency of analysts working for Drs. Longo and Rigler with respect to identification of bundles vs. fragments. **Figure 26** shows that the four analysts all agreed on fiber vs. bundle identification for only 9 of the 44 particles. In other words, only 20% of the time did the four analysts concur on their judgments. This result, when

coupled with the results presented in **Figures 24 and 25**, firmly establishes that the visual distinctions made between particles and bundles by Drs. Longo and Rigler's analysts are scientifically invalid and unacceptable.

D. Statistical Distinctions Between Fibers And Fragments

As noted above, visual distinctions between fibers, bundles of fibers and non-asbestiform cleavage fragments are quite subjective – and in the case of the analysts employed by Drs. Longo and Rigler, done unreliably and in a way that is not reproducible. There is a scientifically accepted methodology, however, for determining whether a population of amphibole is asbestiform or non-asbestiform, based on their **statistical** distinction between their distributions of sizes.

Specifically, a population of amphiboles will have different, characteristic distributions of aspect ratio, depending on whether they are asbestiform or non-asbestiform.⁸⁸ These can be analyzed accurately and in a way that is reproducible using statistics.

1. Background on statistical tests of population differences

Summary: A *t* test assesses whether two populations have the same or different means. We can use this test to determine whether the data from the Longo/Rigler MDL Reports show a population of non-asbestiform cleavage fragments or asbestiform fibers.

As noted in my geostatistics textbook, “today’s earth scientists need to be able to critically evaluate sampling designs, to understand the concept of statistical analysis, and be able to evaluate and interpret the results of statistical tests applied in a wide range of fields.”⁸⁹ In considering the problem of particle size distributions in talcum powder impurities, only the most basic of such statistical methods is necessary – the need to distinguish among the average particle dimensions based on the ratio of length to width (aspect ratio). Comparisons between the mean (\approx average) are so basic that even Microsoft Excel can calculate them. Here, the need for statistics is based on the problem of discriminating among known populations of non-asbestiform tremolite, asbestiform tremolite and the particle measurements in the Longo/Rigler MDL reports. For simplicity, these populations can be compared two at a time.

The appropriate test here is called a **two-tailed *t* test**. It allows for testing of the hypothesis that “the two samples are drawn from populations with different means.”⁹⁰ In conducting this analysis, the underlying assumption is that the two populations (here, asbestiform vs. non-

⁸⁸ 2/5/19 Longo Depo. 290:11-21 (“Q. Okay. And the nonasbestiform version of the same amphibole has a different characteristic distribution? A. Yes, it does. Q. And you did not generate a particle size distribution chart like the one in Blount’s paper -- the ones in Blount’s paper in your report? A. Not for the MDL samples, no.”); 2/6/19 Rigler Depo. 190:10-25 (“Q. That there’s a characteristic -- there is a characteristic particle size distribution for asbestos; is that correct? A. Well, depending on how that sample’s been processed, you’re going to have different fiber sizes, different -- they’re going to be different. You’re going to have different aspect ratios and different sizes. Q. For any given sample that everyone agrees is asbestos, it’s going to have a characteristic particle size distribution; right? A. It can.”); *id.* 191:10-13 (“Q. Do cleavage fragments have a different particle size distribution than asbestos? A. They can.”).

⁸⁹ McKibbin and Dyar (201) *Geostatistics Explained*. Cambridge University Press.

⁹⁰ *ibid.*

asbestiform) have comparable variation – this is called “equal variance” in statistics-speak. Then a critical value for the t test is selected to specify the desired level of confidence for the answer. It is conventional to use a 95% confidence limit, which means that conclusions can be drawn with a 95% chance that they are correct.

Thus, **Figure 27a** shows a normal distribution for a hypothetical population.

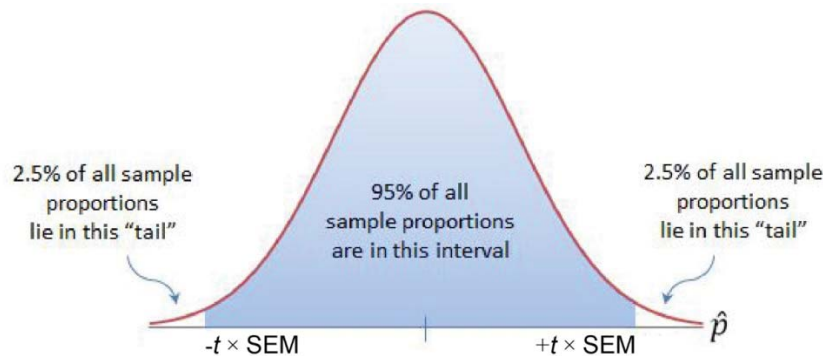


Figure 27a. Schematic of a normal population distribution illustrating the concept of confidence interval.

Here, the 95% confidence interval, which is estimated from a sample by using the t statistic, is indicated in blue, where SEM is the standard error of the mean of the population.⁹¹ Therefore, 5% of the means of this sample will lie outside this range, but if the mean lies within the 95 interval, then it will be considered to have come from a population with a mean the same as this one.

The t test is used to assess whether the mean of a sample lies within or outside the 95% confidence limit of a population, implying that the two samples come from the same population. **Figure 27b** shows two populations that are being compared:

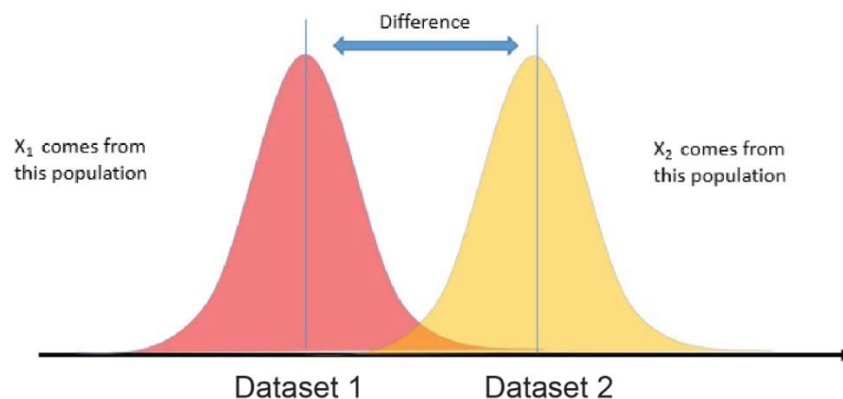


Figure 27b. Adapted from <https://reexplorations.wordpress.com/2015/08/13/hypothesis-tests-2-sample-tests-ab-tests/>.

⁹¹ McKillip and Dyar (2010) *Geostatistics Explained*. Cambridge University Press.

In the figure, the two populations barely overlap, and only within the 2.5% confidence limit on the extreme edges of the curves. As illustrated, these two populations can be said to derive from different sources.

A t test assesses whether two populations have the same or different means, which can be employed to assess if the data from the Longo/Rigler MDL Reports come from a population of non-asbestiform cleavage fragments or asbestiform fibers.

2. Statistically significant differences are seen between asbestiform tremolite and non-asbestiform tremolite cleavage fragments

Summary: Use of the t test applied to peer-reviewed data shows two distinct populations of shapes: asbestiform and non-asbestiform.

Now, consider the application of the two-tailed t test to making distinctions between asbestiform and non-asbestiform particle morphologies. Here, the hypothesis is whether the aspect ratio (particle length divided by width) is statistically different for non-asbestiform tremolite than for asbestiform tremolite. To understand this problem, comparisons among pairs of datasets can be made using three available populations of data:

1. Non-asbestiform amphiboles from the compilation of **Wylie and Virta (2016)**, who provide data on the lengths and widths of amosite, crocidolite, chrysotile and nonfibrous tremolite;⁹²
2. Asbestiform tremolite data from **Harper et al. (2014)**;⁹³ and
3. Particles in the **Longo/Rigler MDL Report**.

Using these data, the first test is whether asbestiform and non-asbestiform particle populations are different. These are shown here, in **Figure 28a**:

[**Figure 28a** on next page.]

⁹² Wylie and Virta (2016) Size distribution measurements of amosite, crocidolite, chrysotile, and nonfibrous tremolite. *Digital Repository at the University of Maryland*, <http://dx.doi.org/10.13016/M2798Z>.

⁹³ Harper et al. (2014) Characterization of Lone Pine, California tremolite asbestos and preparation of research material. *Ann. of Occp. Hyg.*, **2014**, 1-13, <https://academic.oup.com/annweh/article/59/1/91/2464346#supplementary-data>.

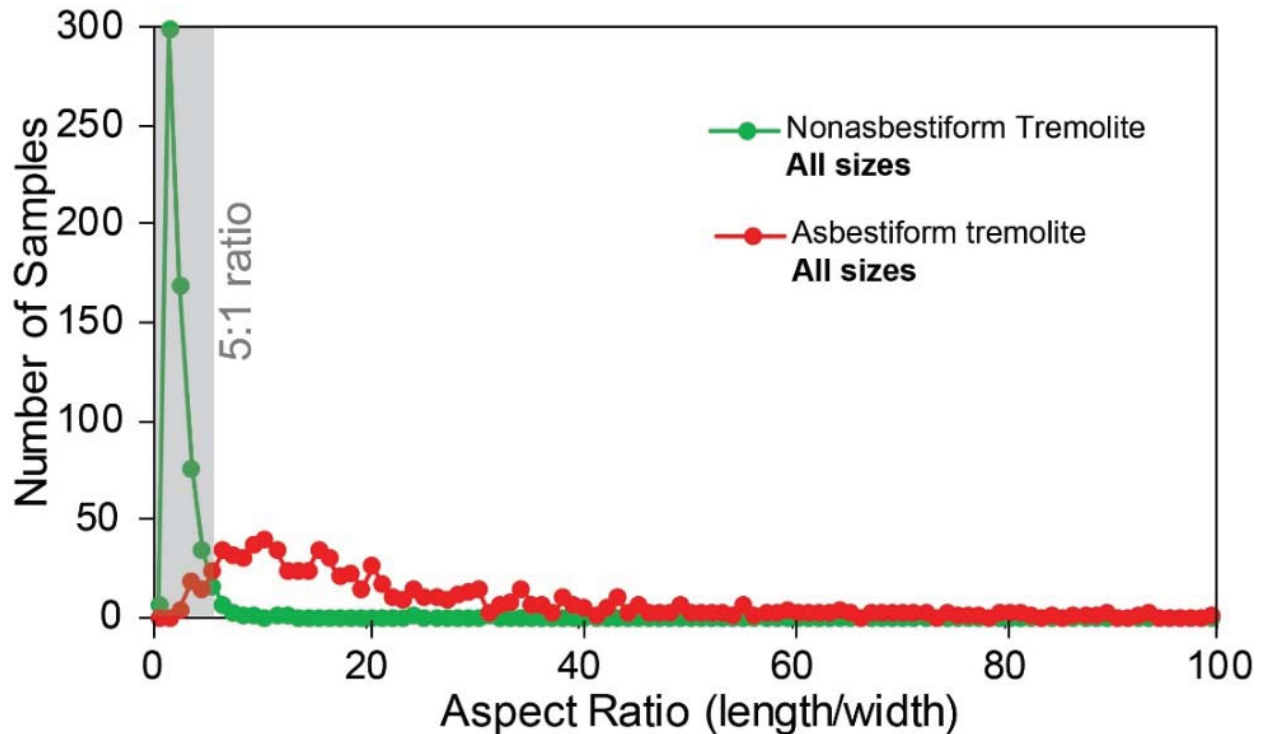


Figure 28a. Distribution of aspect ratios for non-asbestiform vs. asbestiform particles of amphibole, the dominant impurity found in talcum powder. This graph shows all the data in the two repositories, Wylie and Virta (2016) and Harper et al. (2014).

Using the available peer-reviewed data, cleavage fragments (non-asbestiform tremolite) are indicated in green and asbestiform tremolite in red. Note that asbestiform fibers can have extremely large aspect ratios – the longest particle in the asbestos suite is $55\text{ }\mu\text{m} \times 0.15\text{ }\mu\text{m}$ – it is so large that it has been cropped out of the figure for clarity. In fact, there are 13 samples in the asbestiform data set with aspect ratios over 100. By contrast, of the 615 non-asbestiform tremolite cleavage fragments, only one has an aspect ratio greater than 32 (it has a value of 115.38). In other words, the two types of particles have very different characteristics. Note also the shaded bar, which indicates the region with an aspect ratio of 5:1 or less. Most of the non-asbestiform tremolite is within that region, most of the asbestiform tremolite is outside.

Figure 28b is the exact same graph as **Figure 28a**, just with the “less than 5:1” region deleted, which becomes interesting when discussing the population distributions. Again notice that there are many particles even at very high aspect ratios above 10 – this is a characteristic of asbestiform fibers. In comparison, almost none of the non-asbestiform particles has an aspect ratio above 10.

[**Figure 28b** on next page.]

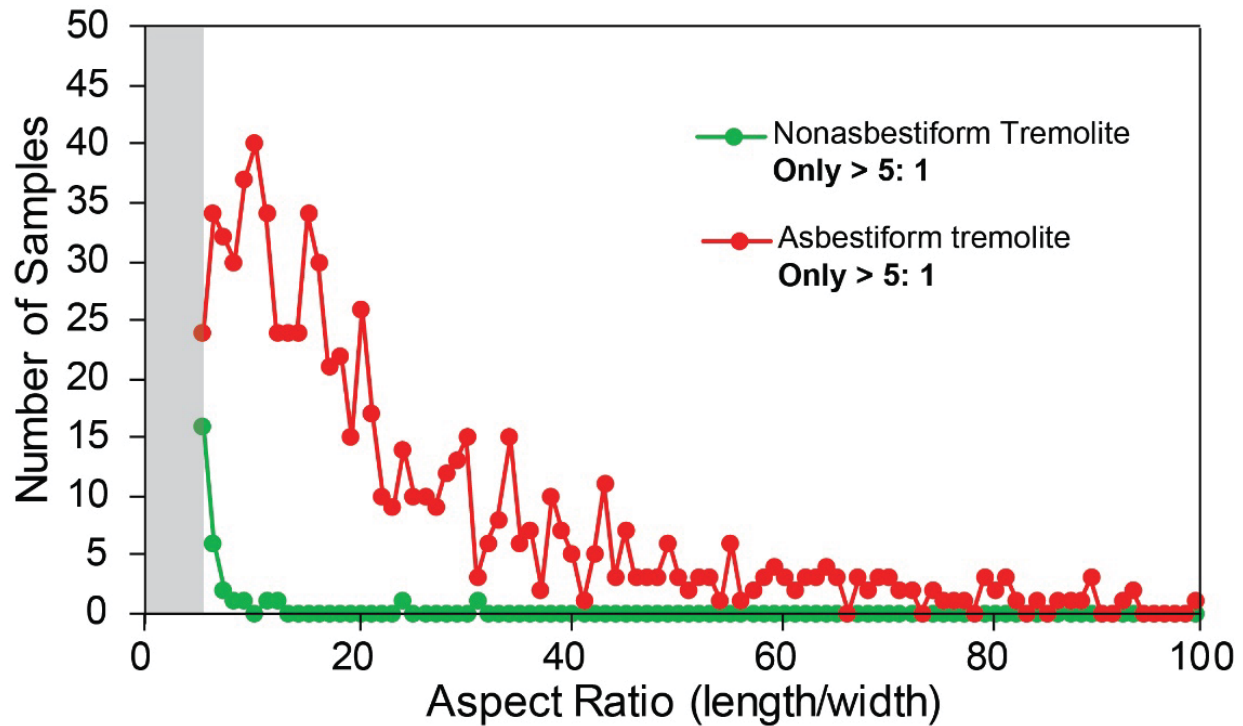


Figure 28b. The same data as *Figure 28a*, except with the “5:1 and less” region deleted.

Visual examination of these plots suggests that non-asbestiform tremolite has different shapes than asbestiform tremolite. This can be proven using the statistical t test described above to see if these samples come from the same population. *Figure 27a* showed the distribution curve for ONE population – but now the test asks if the asbestiform population is the same as the non-asbestiform population. In other words, do the two population distribution curves overlap?

To make this comparison rigorously, the t test described above is used to compare the means of these two populations. **The results shown below in Table 3 demonstrate that these two populations are statistically different.** The top half of the table compares all the population data for asbestiform vs. non-asbestiform tremolite – some 615 and 817 samples, respectively. There, the value of the t statistic is -21.44, a value that is far outside the 95% confidence limit. This means that the **non-asbestiform and asbestiform tremolite particles really are drawn from samples with different means.**

[Table 3 on next page.]

Table 3. Results of *t*-Tests Assuming Equal Variance

ALL Non-asbestiform tremolite (NAT) compared to asbestiform tremolite (AT)

	NAT	AT
Mean	2.70	25.73
# Observations	615	817
<i>t</i> Stat	-21.44	
<i>t</i> Critical two-tail	1.96	
-21.44 lies outside the 95% confidence interval, so the means are different and these samples are not drawn from the same population.		

Non-asbestiform tremolite (NAT) compared to asbestiform tremolite (AT) with aspect ratios >5:1

	NAT	AT
Mean	10.76	26.77
# Observations	35	780
<i>t</i> Stat	-3.54	
<i>t</i> Critical two-tail	1.96	
-3.54 lies outside the 95% confidence interval, so the means are different and these samples are not drawn from the same population.		

3. Comparison to results in the Longo/Rigler MDL Reports

Summary: Use of the t test applied to data from the Longo/Rigler MDL Reports vs. published population data shows that the particles in talcum powder belong to the population of non-asbestiform amphibole.

Returning to the visual evidence presented in **Figures 28a and b**, now consider **Figure 28c**, which is **Figure 28b** with results from the Longo/Rigler MDL Report added in black:

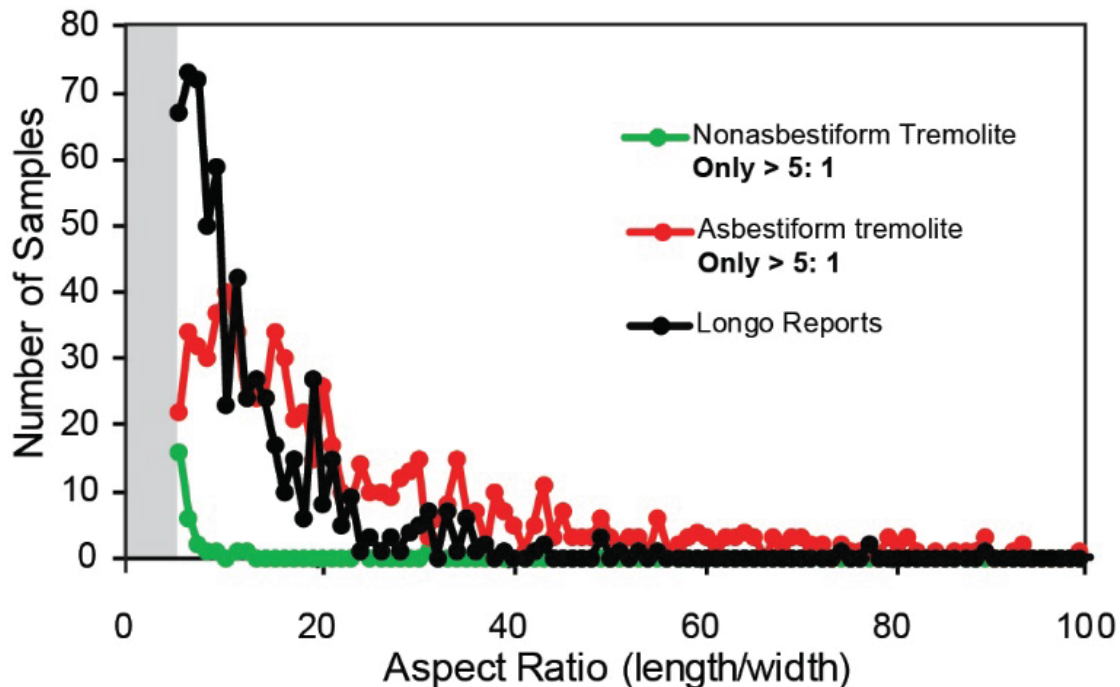


Figure 28c. Data from **Figure 28b** with Longo/Rigler MDL Report results added in black.

Significantly, the data from the Longo/Rigler MDL Reports appears to be trending toward a peak aspect ratio below 5:1, which is characteristic of non-asbestiform tremolite.

Unfortunately, the data collected by the analysts working for Drs. Longo and Rigler do not represent the population of non-asbestiform particles because **they only counted particles with aspect ratios of greater than 5:1.**⁹⁴ Their experimental design neglected to count the vast majority of particles in the typical size range for cleavage fragments, as seen in **Figure 28b**. This omission renders their analysis completely invalid. Indeed, this is a rejection of ISO 22262 methodologies, in particular as found on page 23 of ISO 22262-1, which makes certain observations about whether a population can be considered asbestiform based on observations of the **entire** population, but certainly not the population cut off at a 5:1 aspect ratio.

⁹⁴ The methodologically recognized dimensions for fibers are 3:1 for polarizing light microscopes (PLM) and 5:1 for TEM measurements. Although the Longo/Rigler MDL Reports utilize PLM for evaluating optical properties, the reports do not give aspect ratios for studied particles, either on the photomicrographs themselves or in any tables.

Table 4. Results of <i>t</i>-Tests Assuming Equal Variance		
<i>Particles measured in the Longo/Rigler MDL Reports compared to asbestiform tremolite (AT) with aspect ratios >5:1</i>		
	AT	LONGO/RIGLER
Mean	26.77	13.34
# Observations	780	632
<i>t</i> Stat	12.09	
<i>t</i> Critical two-tail	1.96	
12.09 lies outside the 95% confidence interval, so the means are different and these samples are not drawn from the same population.		
<i>Particles measured in the Longo/Rigler MDL Reports compared to non-asbestiform tremolite (NAT) with aspect ratios >5:1</i>		
	NAT	LONGO/RIGLER
Mean	10.76	13.34
# Observations	35	632
<i>t</i> Stat	-1.41	
<i>t</i> Critical two-tail	1.96	
-1.41 lies inside the 95% confidence interval, so the means are the same; samples are drawn from the same population.		

Fortunately, the Wylie and Virta (2016) data set is large enough to include a significant number of samples with aspect ratios >5:1, so comparisons with that limited size range can still be made.⁹⁵ To make this conclusion using statistics, **Table 4** shows results from *t* tests comparing data from the Drs. Longo and Rigler's MDL Reports for particles with aspect ratios >5:1 against data from Wylie and Virta (2016)⁹⁶ and Harper et al. (2014).⁹⁷ The top set of data compares asbestiform particle aspect ratios against data from Drs. Longo and Rigler's MDL Reports. Here, the *t* statistic of 10.68 lies outside the value of 1.96 for the 95% confidence limit. This establishes that particles measured by Drs. Longo and Rigler do not belong to the same populations as those of asbestiform tremolite on the basis of their shapes. In other words, the **asbestiform and non-asbestiform populations are so different** that they can be distinguished even when a flawed experimental design provides data on particles with aspect ratios greater than 5:1. **In summary, the data from the Longo/Rigler MDL Reports show that even though counts and measurements are only reported for particles with aspect ratios >5:1, statistical tests show that they have identified a population of non-asbestiform cleavage fragments in the talcum powder tested.**

⁹⁵ Note that the available morphology data for asbestiform and non-asbestiform particles come from analyses of the mineral tremolite, which is the dominant species identified by Drs. Longo and Rigler in their November 2018 MDL Report (67%). Most, if not all, of the anthophyllite particles identified by Drs. Longo and Rigler are likely to be talc, and there is no relevant data set for talc.

⁹⁶ Wylie and Virta (2016) Size distribution measurements of amosite, crocidolite, chrysotile, and nonfibrous tremolite. *Digital Repository at the University of Maryland*, <http://dx.doi.org/10.13016/M2798Z>.

⁹⁷ Harper et al. (2014) Characterization of Lone Pine, California tremolite asbestos and preparation of research material. *Ann. of Occp. Hyg.*, **2014**, 1-13, <https://academic.oup.com/annweh/article/59/1/91/2464346#supplementary-data>.

E. Summary Of Particle Morphology Conclusions

In summary, the following flaws in evaluating particle morphology render the Longo/Rigler MDL Reports conclusions invalid:

- **Using TEM to visually distinguish non-asbestiform amphiboles and asbestiform amphiboles is scientifically invalid, as stated in the very protocols upon which Drs. Longo and Rigler purport to rely.**
- **Drs. Longo and Rigler and analysts only counted particles with aspect ratios >5:1 in their TEM studies, which improperly biases their results toward finding an asbestiform particle population.**
- **Particles in the Longo/Rigler MDL Reports belong to the non-asbestiform tremolite population.**
- **There is no evidence to suggest that the particles measured by Drs. Longo and Rigler and analysts are asbestos.**

VIII. CONCLUSIONS

The core problem with the Longo/Rigler MDL Reports is that the methods utilized in the testing and analyses produce completely inconsistent results, rendering them unscientific and subjective. Indeed, **the analysis by Drs. Longo and Rigler presented in the Long/Rigler MDL Reports applied a methodology that was inherently designed to achieve the results they desired for purposes of this litigation, and not scientific.**

Despite producing lengthy, descriptive reports and undertaking extensive measurements according to government protocols, Drs. Longo and Rigler did not properly train their personnel for the task of characterizing impurities in talc, where the possible mineralogy is unconstrained. Thus, they lack the background to understand or interpret their results, especially where, as here, the impurities are tiny, and many possible minerals can be present. Personnel employed by Drs. Longo and Rigler lack sufficient knowledge of proper mineralogical terminology beyond the six defined asbestos mineral species, have **no** understanding of the limitations and errors associated with the techniques used, and fail to compare their results to foundation studies in this discipline.

The Longo/Rigler MDL Reports fail to demonstrate an understanding of the accuracy of the Energy Dispersive Spectroscopy (EDS) technique, which is only semi-quantitative with large error bars. The technique is rarely used to determine the chemical composition of minerals in unbounded studies where the possible minerals present cover a large range of possibilities. Within generally accepted error bars on this technique (ignored and unstated by Drs. Longo and Rigler), asbestos minerals are indistinguishable from many of their non-asbestiform counterparts. In particular, EDS cannot differentiate between talc and anthophyllite. It is simply incorrect for Drs. Longo and Rigler to assert that individual amphibole mineral species can be identified by EDS alone.

The Longo/Rigler MDL Reports also use single crystal selected area electron diffraction (SAED) to confirm the EDS mineral identifications based on crystal structure. But the vast majority of the patterns collected by Drs. Longo and Rigler are not indexed, making them very difficult to interpret. **Moreover, 25% of all common rock-forming minerals have overlapping similar or identical *d*-spacings to what Drs. Longo and Rigler report.** There is no SAED evidence to prove definitively that any specific asbestiform minerals are present.

Polarizing light microscope (PLM) images of various types are used in the Longo/Rigler MDL Reports to prove presence of asbestos in the samples. Again, the PLM images themselves do not uniquely identify “asbestos” mineral species. Rather, some of them can be interpreted to suggest the presence of amphibole group minerals (there are 76 end-members, and many more intermediates) or something else. The latter might be talc, which appears to have very close to the same color as amphibole in the dispersion staining images. The PLM images alone do not categorically prove the presence of any specific mineral species.

The experimental design used by Drs. Longo and Rigler for interpreting the number of non-talc particles present in talcum powder ignores well-known databases on particle dimensions, which indicate that non-asbestiform particles occur with aspect ratios (particle length divided by width) averaging 2.7. They ignore all particles with aspect ratios less than 5:1, rendering the particle dimension analyses nearly useless for distinguishing cleavage fragments from fibers.

Because the distribution of non-asbestiform particles has some samples in the range above 5:1, **it is possible** to compare that truncated (aspect ratio greater than 5:1) dataset for cleavage fragments (average aspect ratio of 10.8) to that of asbestiform tremolite with ratios above 5 (average ~26.8). The average aspect ratio for all particles measured by Drs. Longo and Rigler is 13.3, suggesting that they are a population of cleavage fragments. **Statistical analyses of these aspect ratio populations establish that the particles measured by Drs. Longo and Rigler belong to the population represented by *non-asbestiform* amphibole.**

There is no evidence (EDS, SAED, or otherwise) to confirm that any of the “fibers” identified as anthophyllite by Drs. Longo and Rigler are really anthophyllite.

In summary, the Longo/Rigler MDL Reports contain only subjective analyses with inconsistent results that do not stand up to scientific scrutiny. It appears that Drs. Longo and Rigler and their analysts are just using the equipment and methodology with which they are familiar from their work in bulk asbestos sampling to undertake analyses in a totally different application for which they are inappropriate. The Longo/Rigler MDL Reports are far from the type of quantitative study that would withstand scientific review or be accepted for publication in a peer-reviewed scientific journal. **The Longo/Rigler MDL Reports completely fail to demonstrate that *any* recognized asbestos minerals are present in talcum powder in *any* concentration with *any* asbestiform shapes.**

Finally, given the compounding nature of all of the individual methodological errors in the Longo/Rigler MDL Reports, any resultant conclusions drawn from testing by Drs. Longo and Rigler and associates are scientifically invalid. Every methodological error in their testing results in false positive findings of asbestos, but not false negatives. The testing described in the reports can only be described as a series of errors, each of which acts to amplify the errors preceding it. **The results reported in the Longo/Rigler MDL Reports cannot be considered scientifically valid, calling into question the competence of Drs. Longo and Rigler and their analysts to undertake such work.**

MATERIALS REVIEWED AND CONSIDERED

Longo and Rigler Analyses

Analysis of Historical Johnson's Baby Powder M69042 (Oct. 2018)
Longo, Rigler, and Egeland, MAS Project 14-1852 - Below the Waist Application of Johnson & Johnson Baby Powder (Sept. 2017)
Longo and Rigler, Supplemental Expert Report & Analysis of Johnson and Johnson Baby Powder and Valeant Shower to Shower Talc Products for Amphibole Asbestos (Mar. 11, 2018)
Rigler, MAS TEM Coefficient of Variation for Tremolite and Anthophyllite in Talc - A Quality Control Study (Sept. 6, 2018)
Longo and Rigler, Analysis of Johnson's Baby Powder Historical Samples - Asian - M69248 (7 Samples) (Nov. 2, 2018)
Longo and Rigler, The Analysis of Johnson & Johnson's Historical Baby Powder & Shower to Shower Products from the 1960's to the Early 1990's for Amphibole Asbestos (Nov. 14, 2018)
Longo and Rigler, The Analysis of Johnson & Johnson's Historical Product Containers and Imerys's Historical Railroad Car Samples from the 1960's to the Early 2000's for Amphibole Asbestos (Jan. 15, 2019)
Longo and Rigler, Quality Assurance Report - Johnson and Johnson's JBP and STS, Imerys Railcar and Asian Talc for Amphibole Asbestos (Jan. 31, 2019)
Diffraction Verifications-M68233
Diffraction Verifications-M68503
Diffraction Verifications-M69042
Diffraction Verifications-M69248
Diffraction Verifications-M69751
Diffraction Verifications-M69757
Global particle table M65205-001
Global particle table M65208-001
Global particle table M65228-001
Global particle table M65329-018
Global particle table M65329-041
Global particle table M65329-043
Global particle table M66173-002
Global particle table M66173-003
Global particle table M66203-001
Global particle table M66203-006
Global particle table M66203-007
Global particle table M66352-002
Global particle table M66405-001
Global particle table M66510-001
Global particle table M66512-001
Global particle table M66514-001

Global particle table M66515-001
Global particle table M66516-001

Depositions and Exhibits

Deposition of William Longo, Nov. 6, 2018
Deposition of William Longo, Nov. 27, 2018
Deposition of William Longo, Dec. 5, 2018
Deposition of William Longo, Feb. 5, 2019, and Exhibits
Deposition of Rigler, Feb. 6, 2019, and Exhibits
Deposition of William Longo, Oct. 24, 2018
Deposition of William Longo, Oct. 31, 2018
Deposition of William Longo, Jan. 7, 2019

Scientific Literature

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Campbell et al. (1997) Information Circular 8751, U.S. Bureau of Mines.
Dyar and Gunter (2008) <i>Mineralogy and Optical Mineralogy</i> , Mineralogical Society of America
Gary, McAfee, and Wolf, Eds. (1974) <i>Glossary of Geology</i>
Gunter (2010) <i>Defining Asbestos: Differences between the Built and Natural Environments</i> , 60 CHIMIA No. 10, 747, 748
Harper et al. (2014) Characterization of Lone Pine, California tremolite asbestos and preparation of research material. <i>Ann. Occp. Hyg.</i> , 2014 , 1-13.
McCrone (1980) <i>Asbestos Particle Atlas</i> . Ann Arbor Science
McKillup and Dyar (2010) <i>Geostatistics Explained</i> , Cambridge University Press.
Miller and Mirtič (2013) Accuracy and precision of EDS analysis for identification of metal-bearing minerals in polished and rough particle samples, <i>Geologija</i> , 56 , 5-17.
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Newbury and Rotchie (2015) Performing elemental microanalysis with high accuracy and high precision by scanning electron microscopy/silicon drift detector energy-dispersive X-ray spectrometry (SEM/SDD-EDS), <i>Journal of Material Sciences</i> , 50 , 493-518
Newbury (1995) "Standardless" quantitative electronic probe microanalysis with energy-dispersive x-ray spectrometry: Is it worth it? <i>Anal. Chem.</i> , 67 , 1866-1871.
Pierce et al. (2017) Evaluation of the presence of asbestos in cosmetic talcum products, <i>Inhalation Toxicology</i> , 29 , 443-456
Rhoades (1976) XIDENT – A computer technique for the direct indexing of electron diffraction spot patterns. Research Report 70/76, Dept. of Mechanical Engineering, Univ. of Canterbury, Christchurch, New Zealand
Severin (2004) <i>Energy Dispersive Spectrometry of Common Rock Forming Minerals</i> , Springer, Kluwer.
Severin (1984) <i>Energy Dispersive Spectrometry of Common Rock-Forming Minerals</i> , Kluwer

Shannon et al. (2017) Refractive indices of minerals and synthetic compounds, <i>Amer. Mineral.</i> , 102 , 1906-1914
Su (2003) How to Use the <i>d</i> -Spacing/Interfacial Angle Tables to Index Zone-Axis Patterns of Amphibole Asbestos Minerals Obtained by Selected Area Electron Diffraction in Transmission Electron Microscope, 2008 report, Asbestos Analysis Consulting, Newark, DE
Su (2003) A rapid and accurate procedure for the determination of refractive indices of regulated asbestos minerals, <i>American Mineralogist</i> , 88 , 1979-1982
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Zoltai (1981) Amphibole Asbestos Mineralogy, <i>Reviews in Mineralogy & Geochemistry</i> , 9 , 237-278

Standards and Regulations

40 C.F.R. 1 (7-1-03 Edition).
40 C.F.R. 763
ASTM D5755 – 09 (2014)
ASTM D5756 – 02 (2008)
Asbestos Hazard Emergency Response Act, AHERA
International Agency for Research on Cancer (2012) <i>Arsenic, Metals, Fibres, and Dusts</i> , IARC Monographs on the Evaluation of Carcinogenic Risks to Humans
International Agency for Research on Cancer (2012), <i>Monographs on the Evaluation of Carcinogenic Risks to Humans Vol. 100C: Asbestos (Chrysotile, Amosite, Crocidolite, Tremolite, Actinolite and Anthophyllite)</i> ,
ISO 10312 (1995)
ISO 13794 (1999)
ISO 22262-1 (2012)
ISO 22262-2 (2014)
ISO 22262-3 (2016)
National Institute for Occupational Safety and Health (2011) <i>Asbestos Fibers and Other Elongate Mineral Particles: State of the Science and Roadmap for Research</i> , Current Intelligence Bulletin 62
National Research Council (1984) <i>Asbestiform Fibers: Nonoccupational Health Risks</i>
Perkins and Harvey (1993) <i>Test Method: Method for the Determination of Asbestos in Bulk Building Materials</i> , EPA/600/R-93/116
Yamate et al. (1984) Methodology for the measurement of airborne asbestos by electron microscopy, U.S. Environmental Protection Agency Report

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http://nrmima.nrm.se/
http://rruff.geo.arizona.edu/AMS/amcsd.php
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http://www.charfac.umn.edu/instruments/eds_on_sem_primer.pdf
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https://rexplorations.wordpress.com/2015/08/13/hypothesis-tests-2-sample-tests-ab-tests/
https://www.geologicalsocietyct.org/geoconnections-articles/recent-analyses-of-connecticut-amphiboles

EXHIBIT A

CURRICULUM VITAE MELINDA DARBY DYAR

Department of Astronomy
Mount Holyoke College
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1700 East Fort Lowell, Suite 106
Tucson, AZ 85719-2395
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Amherst, MA 01002
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Education:

Ph.D., Geochemistry, Massachusetts Institute of Technology, Cambridge, Mass. Thesis topic: Crystal chemistry and statistical analysis of iron in mineral standards, micas, and glasses.

Advisor: Roger G. Burns.

B.A., Geology and Art History¹, Wellesley College, Wellesley, Mass. Thesis topic: Geology of the Broadmoor Wildlife Sanctuary, South Natick, MA: Structural and petrographic analysis.

Advisor: Margaret Thompson. Summer Field Camp, Indiana University, Cardwell, Montana.

Employment:

Senior Scientist, Planetary Science Institute, 2015-present.

Kennedy-Schelkunoff Professor and Chair, Department of Astronomy, Mount Holyoke College and Five College Astronomy Department, 2011-present.

Associate Professor and Chair, Department of Astronomy, Mount Holyoke College and Five College Astronomy Department, 2002-2011.

Associate Professor Department of Earth and Environment, Mount Holyoke College and Five College Astronomy Department, 2002-2008.

Five College Graduate Faculty in Astronomy, University of Massachusetts, 2002-present.

Visiting Associate Professor, Department of Astronomy and Department of Earth and Environment, Mount Holyoke College and Five College Astronomy Department, 2001-2002.

Visiting Associate Professor, Department of Astronomy, University of Massachusetts (Amherst), 2001-2002.

Affiliated Staff, Department of Geological Sciences, University of Idaho, 2000-2018.

Visiting Assistant Professor, Department of Astronomy and Department of Earth and Environment, Mount Holyoke, 1998-2001.

Assistant Professor, Department of Geology and Astronomy, West Chester University, 1993-1998.

Visiting Assistant Professor, Department of Geology, Smith College, 1995-1996.

Assistant Professor, Department of Geological Sciences, University of Oregon, 1986-1993.
Member, Materials Science Institute, 1987-1993.

Research Fellow, Division of Geological and Planetary Sciences, California Institute of Technology, 1985-1986 (G.R. Rossman, supervisor).

Post-Doctoral Fellow, Department of Earth, Atmospheric, and Planetary Sciences, Massachusetts Institute of Technology, 1985 (R.G. Burns, supervisor).

Research Assistant, Department of Earth, Atmospheric, and Planetary Sciences, Massachusetts Institute of Technology, 1980-1985.

Research Staff, Chevron Oil Field Research Company, La Habra, CA, summer, 1982.

Assistant Instructor, Indiana University Geologic Field Station, Cardwell, MO, summer, 1980.

Professional Societies:

Association for Women Geoscientists
Geological Society of America (Fellow)
Mineralogical Society of America (Fellow)

American Geophysical Union
North American Society for LIBS
Geochemical Society (Fellow)

¹ Course requirements for the art history major were completed while a graduate student at MIT.

Honors:

Sigma Xi, 1980
1984 Mineralogical Society of America (M.S.A.) Grant for Research in Crystallography
1990-1991 National Lecturer, Mineralogical Society of America
Outstanding Service Award, Mineralogical Society of America, 1991
Fellow, Mineralogical Society of America, 1995
Girls' Incorporated, Holyoke, Massachusetts, Honoree, 1 April, 2004
Meribeth E. Cameron Faculty Award for Scholarship, Mount Holyoke College, 2010
Participating Scientist, Mars Science Laboratory Science Team, 2012-2014
J.K. Gilbert Award for outstanding contributions to planetary science, Geological Society of America, 2016
Fellow, Geological Society of America, 2017
Hawley Medal, 2017, Mineralogical Association of Canada
Eugene Shoemaker Distinguished Scientist Medal, NASA Solar System Exploration Research Virtual Institutes, 2018
Helmholtz International Fellow, 2018-2021
Fellow, Geochemical Society, 2019.

Professional Service:

M.S.A. Research Grants Committee, 1991
M.S.A. Science Grants Committee, 1991
The Geochemical Society Program Committee, 1991-1994
National Science Foundation Instrumentation and Laboratory Instruction Panel, 1988 and 1992
National Science Foundation Undergraduate Curriculum and Course Development Panel, 1991
National Science Foundation Workshop: The Role of Faculty in the Disciplines in the Undergraduate Education of Future Teachers, invited participant, contributor to working paper, 1992
Program Committee, Geological Society of America National Meetings, 1992-1994
American Geophysical Union Workshop: Shaping the Future of Undergraduate Earth Science Education, invited participant and contributor to working paper, 1996
M.S.A. Lecture Program Committee, 1998-2000; Chair 1999-2000
M.S.A. Crystallography Research Grant Committee 1998-1999
Council for Undergraduate Research (C.U.R.), Councillor, 1999-2000
American Geological Institute (A.G.I.) Outreach Committee, 2000-2003
Associate Editor, *American Mineralogist*, 2000-present
Review Panel, NASA Cosmochemistry Program, 2001
Review Panel, NSF/NATO Postdoctoral Fellowship Program, 2002-2003
Judges Panel, Name the Rovers contest, 2003
Review Panel, NSF, CCLI Program, 2003
Instrument Selection Review Panel, Mars Science Lander 2009, NASA, 2004
Review Panel, NSF, CCLI Program, 2004
International Program Committee, Goldschmidt Conference, 2005
Executive Committee, AWIS National Meeting, 2005
Review Panel, NASA, 2006
Review Panel, NASA, 2007
Review Panel, NASA, 2008
Review Panel, NASA, 2008
Review Panel, NSF, 2008
Review Panel, NASA, 2009
Review Panel, NSF, 2009
Review Panel, NASA, 2009

Review Panel, NASA, 2010
Review Panel, NASA, 2011
Review Panel, NASA, 2012
Review Panel, NASA, 2013
Review Panel, NASA, 2015
Review Panel, NASA, 2016
Review Panel, NSF, 2017 (×2)
Review Panel, NASA, 2018

Invited Talks and Professional Presentations:

University of California at Riverside, 1986 and 1991²
University of Maine at Orono, 1987 and 1991¹
Oregon State University, 1986 and 1991
Massachusetts Institute of Technology, 1987
Wellesley College, 1987
Smith College, 1988
State University of New York at Albany, 1989
Southern Methodist University, 1989
University of Washington, 1990
University of Saskatchewan, 1991¹
San Diego State University, 1991¹
University of California at Davis, 1991¹
Sonoma State University, 1991¹
University of Calgary, 1991¹
University of New Mexico, 1991¹
University of Houston, 1991¹
Louisiana State University, 1991¹
Texas Tech, 1991¹
University of Chicago, 1992
Penn State University, 1992
University of Kentucky, 1992
University of Colorado at Boulder, 1993
European Research Conference, Hydrogen-Containing Defects in Minerals and Ceramics, 1993
Deep Continental Studies Workshop, Microknowledge and Megathinking, 1993
Portland State University, 1993
Hopi Buttes Workshop, invited participant, 1993
Rutgers University, 1994
University of North Carolina, 1994
Southern Methodist University, 1994
University of Massachusetts at Amherst, 1996
Mount Holyoke College, 1997
University of Western Ontario, 2000
University of Idaho, 2001
Eastern Washington University, 2001
Wellesley College, 2001
State University of New York at Stony Brook, 2003
Lunar and Planetary Institute, 2003
Brearley School, 2004

²talk sponsored by Mineralogical Society of America Lecture Program.

Massachusetts Institute of Technology, 2004
University of Massachusetts, 2004
Wellesley College, 2004
Rhode Island College, 2006
SUNY Binghamton, 2007
University of New Mexico, 2007
Colby College, 2008
Rutgers University, 2009
NASA Summer Science Institute, Goddard Space Flight Center, 2009
Hartwick College, 2010
M.I.T., 2011
Wellesley College, 2011
Brown University, 2011
Indiana University, 2011
TED talk, 2012
Texas Tech University, 2013
Skidmore College, 2014
University of Massachusetts Amherst, 2014
Rutgers University, 2014
Planetary Science Institute, 2015
TED-X, Springfield, MA 2015
University of Massachusetts, Amherst, 2015
Brown University, 2015
Amherst College, 2016
Rensselaer Polytechnical Institute, 2017
M.I.T., 2017
Williams College, 2018
Keynote Plenary Speaker, AAAS, January 2018
Colby College, 2018
University of Vermont (Burlington), 2018
Goddard Space Flight Center, 2019
Applied Physics Laboratory, 2019

College and University Service:

Structural Geologist Search Committee, University of Oregon (UO) 1987-1988
Chair, Affirmative Action Search Committee, UO, 1988
Chair, X-ray and Thin Section Committee, Dept. of Geological Sciences, UO, 1986-1987
Faculty Advisor, Condon Undergraduate Society, UO, 1986-1988
Affirmative Action Liaison, Dept. of Geological Sciences, UO, 1986-1989
Materials Science Institute Budget Committee, UO, 1987-1992
Treasurer, Materials Science Institute, UO, 1988-1992
Director, Materials Science Institute Research for Undergraduates Program, UO, 1988 & 1989
Physics Department Condensed Matter Search Committee, UO, 1988 and 1989
Graduate Teaching Fellow Coordinator, Dept. of Geological Sciences, UO, 1988-1989
Seismology Search Committee, Dept. of Geological Sciences, UO, 1988-1989
Volcanologist Search Committee, Dept. of Geological Sciences, UO, 1989-1990, 1990-1991
Telephone Counselor, Dept. of Geological Sciences, UO, 1990-1991
Chair, Displays Committee for Cascade Hall, UO, 1990-1993
Computer Coordinator, Dept. of Geological Sciences, UO, 1989-1993
Member, President's Task Force on Campus Infrastructure and Technology, UO, 1990-1992
Member, Committee on Campus Hazardous Waste Remediation, UO, 1988-1993

Member, University Library Committee, UO, 1987-1989
Member, Faculty Advisory to the Museum of Art, UO, 1989-1993
Chair, Faculty Advisory to the Museum of Art, UO, 1990-1993
Member, Departmental Computer Lab Managers, UO, 1989-1993
Board Member, Faculty Club of the University of Oregon, 1988-1993
Secretary-Treasurer, Faculty Club of the University of Oregon, 1989-1990
Member, Docent Council, University of Oregon Museum of Art, 1988-1993
Member, Board of Governors, University of Oregon Museum of Art, 1988-1993
Member, Curriculum Committee, Dept. of Geology and Astronomy, WCU, 1993-1996
Member, College of Arts and Sciences Recruitment Committee, WCU, 1994-1995
Internship Coordinator, Dept. of Geology & Astronomy, WCU, 1993-1997³
Member, Undergraduate Review Committee, Dept. of Geology & Astronomy, WCU, 1993-1998²
Member, Graduate Review Committee, Dept. of Geology & Astronomy, WCU, 1994-1998²
Member, Fellowship Committee, Mount Holyoke College, 2002-2006
Member, Planning and Budget Committee, 2003-2004
Chair, Fellowship Committee, Mount Holyoke College, 2003-2006
Coordinator of Universal Application Funding, 2003-2012
Member, Search Committee for Fellowships and Pre-Graduate Advising, 2009-2010
Task Force on Curriculum to Career, 2011
Member, Curriculum Committee, Five College Astronomy Department, 1999-present
Member, Radiation Safety Committee, Mount Holyoke College, 1999-present
Chair, Astronomy Department, 1999-present
Senate member, Five College Astronomy Department, 1999-present
Advisory Committee, 2017-2018

Miscellaneous Presentations to the College Community and Beyond:

Mathematics Department, MHC, 2000
Five College Geology Symposium, February 2001
Mount Holyoke Club of Bridgeport, CT, 2003
Lyon Lecture series, Denver, 25 Oct. 2003
Family Weekend, 31 Oct. 2003
Mathematics Department, MHC, February 2004
Five College Geology Symposium, February 2004
Mars lecture, AST 11, Amherst College, 5 March 2004
Fascinating Professor program, Francis Perkins scholars, 9 March, 2004
South Hadley Lions Club, 6 April 2004
East Longmeadow Library, 1 May, 2004
Dedication of Kendade Hall, 8 May, 2004
Class of 1959 reunion dinner, 28 May 2004
Mount Holyoke Club of South Hadley, 9 June, 2004
NOVA/WGBY fundraiser, Mount Holyoke College, 14 June, 2004
Summer math for high school students, summer Mars project, July, 2004
MHC Office of Admissions, summer staff training seminar, August, 2004
Family Weekend, 30 Oct. 2004
Hughes Symposium on Integrating Undergraduates into Research Programs, January 2005
Mount Holyoke Club of Houston, March, 2005
Springfield Star Club, April, 2005

³Maternity leave from West Chester University was taken during the academic years 1995-1996 and 1997-1998.

Mount Holyoke Reunion, June 2005
 Century Club, Springfield, MA, March 2006
 Mount Holyoke Reunion, June 2006
 Mid-Coast Maine Mount Holyoke Club, June, 2006
 MacDuffie School, January 2007
 Mount Holyoke Club of New York City, March, 2007
 Stargazers Club, North Scituate, RI, April 2007
 Mount Holyoke Gala, Washington D.C., April 2009
 Mount Holyoke Club of Bridgeport, December 2011
 Development Office function in New York City, May 2012
 Development Office function in San Francisco, October 2012
 Development Office function in Los Angeles, October 2012
 Development Office function in Boston, November 2012
 Mount Holyoke Club of Cape Cod, May 2013
 Mount Holyoke Club of New Hampshire, June 2013
 Albany Area Amateur Astroomers, October, 2014
 New England Society of Economic Geologists, January, 2015
 Mount Holyoke Club of New Hampshire, October, 2015
 Mount Holyoke Club of Fairfield County, October, 2015
 Talk for 6th grade class at Common School, Amherst MA, May, 2017
 Talk for the Development Office, October 2017
 Reunion talk, class of 1967, May 2018

Courses Taught:

Mineralogy I and II (advanced undergraduate)
 Igneous and Metamorphic Petrology (advanced undergraduate)
 Introduction to Earth History (introductory historical geology)
 Introduction to Geology (introductory physical geology)
 Planet Earth (introductory geology/planetary science)
 Geochemistry (graduate and undergraduate)
 Spectroscopy (graduate and undergraduate)
 Geometrics (applications of statistical methods) (graduate and undergraduate)
 Planetary Science (introductory and advanced undergraduate)
 Planetary Science seminar on Mars (advanced undergraduate)
 Spectroscopy of the Planets (advanced undergraduate)
 Meteorites (advanced undergraduate)

Books and Electronic Media:

Dyar, M.D., and Gunter, M.E. (2013) *Mineral Database*. App for I-pad, Mac, I-Phone.
 McKillip, S. and Dyar, M.D. (2010) *Geostatistics Explained, An Introductory Guide for Earth Scientists*.
 Textbook. Cambridge University Press.
 Dyar, M.D., and Gunter, M.E. (2008) *Mineralogy and Optical Mineralogy: A Three-Dimensional
 Approach*. Textbook. Mineralogical Society of America.
 Dyar, M.D. (1999) *Hands-On Mineral Identification*. CD-ROM. Tasa Graphic Arts, Inc., Albuquerque,
 N.M.
 Dyar, M.D., Busch, R.M., and Wiswall, G. (1997, 1998) *The Study of Minerals*. CD-ROM. Tasa Graphic
 Arts, Inc., Albuquerque, N.M.
 Dyar, M.D., McCammon, C.A., and Schaefer, M.W., Eds. (1996) *Mineral Spectroscopy: A Tribute to
 Roger G. Burns*. Special Publication #5, The Geochemical Society, Washington, D.C., 400 pp.

Papers:

1. Dyar, M.D., and Burns, R.G. (1981) Coordination chemistry of iron in glasses contributing to remote-sensed spectra of the moon. *Proc. Lunar and Planet. Sci. Conf.*, **12B**, 695-702.
2. Burns, R.G., and Dyar, M.D. (1983) Spectral chemistry of green glass-bearing 15426 regolith. *Proc. Lunar and Planet. Sci. Conf.*, 14, *J. Geophys. Res.*, **88**, B221-B228.
3. Dyar, M.D., and Birnie, D.P. (1984) The effects of quench media on iron partitioning and ordering in a lunar glass. *Proc. 1st Intl. Conf. on Glass in Planet. and Geolog. Phenomena, J. Non-Cryst. Sol.*, **67**, 397-412.
4. Stone, A.J., Parkin, K.M., and Dyar, M.D. (1984) STONE: a program for resolving Mössbauer spectra. DEC Users Soc. 11-720, Marlboro, Mass.
5. Dyar, M.D. (1984) Precision and interlaboratory reproducibility of measurements of the Mössbauer effect in minerals. *Amer. Mineral.*, **69**, 1127-1144.
6. Dyar, M.D. (1984) Experimental methods for quenching structures in lunar-analog silicate melts: variations as a function of quench media and composition. *Proc. Lunar and Planet. Sci. Conf.*, 15, *J. Geophys. Res.*, **84**, supplement, C233-C239.
7. Dyar, M.D. (1985) A review of Mössbauer data on inorganic glasses: the effects of composition on iron valency and coordination. *Amer. Mineral.*, **70**, 304-316.
8. Birnie, D.P., and Dyar, M.D. (1986) Cooling rate calculations for silicate glasses. *Proc. Lunar and Planet. Sci. Conf.*, 16, *J. Geophys. Res.*, **91(B4)**, D509-D513.
9. DeGuire, M.R., Dyar, M.D., O'Handley, R.C., and Kalongi, G. (1986) Magnetic ordering in splat-quenched ferrite-silica compositions. *J. Magn. Magn. Mater.*, **54-57**, 1337-1338.
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532. Dyar, M.D., McCanta, M.C., Lanzirrotti, A., Gunter, M., Steve, C., Breitenfeld, L., and Wagoner, C. (2018) Orientation dependence of vanadium x-ray absorption spectra: Implications for studies of V valence and resultant fugacity. *Lunar Planet. Sci. XLIX*, Lunar Planet. Inst., Houston, (abstr.) #1067.
533. Sklute, E.S., Kashyap, S., Wang, P., Tague, T.Jr., Dyar, M.D., and Holden, J.F. (2018) Effects of surrounding medium (fluid vs. air) on spectral properties of nanophase iron (oxyhydr)oxides. *Lunar Planet. Sci. XLIX*, Lunar Planet. Inst., Houston, (abstr.) #1064.
534. Breitenfeld, L.B., Dyar, M.D., Tokle, L., and Robertson, K. (2018) Predicting ilmenite-geikielite composition using Raman spectroscopy. *Lunar Planet. Sci. XLIX*, Lunar Planet. Inst., Houston, (abstr.) #1072.
535. Levy, J.S., Fassett, C.I., Rader, L.X., King, I.R., Chaffey, P.M., Wagoner, C.M., Hanlon, A.E., Watters, J.L., Kreslabsky, M.A., Holt, J.W., Russell, A.T., and Dyar, M.D. (2018) Distribution and characteristics of boulder halos at high latitudes on Mars: Reworking of sediment and ice indicates boulders outlast the craters that excavate them. *Lunar Planet. Sci. XLIX*, Lunar Planet. Inst., Houston, (abstr.) #1093.
536. Cohen, B.A., Petro, N.E., Lawrence, S.J., Dyar, M.D., Elardo, S.M., Grinspoon, D.H., Hiesinger, H., Liu, Y., McCanta, M.C., Norman, M.D., Schwenzer, S.P., Swindle, T.D., vander Bogert, C.H., and Wiens, R.C. (2018) CURIE: Constraining solar system bombardment using in situ radiometric dating. *Lunar Planet. Sci. XLIX*, Lunar Planet. Inst., Houston, (abstr.) #1029.

537. Widemann, T., Marcq, E., Tsang, C., Mueller, N., Kappel, D., Helbert, J., and Dyar, M.D. (2018) The Venus Emissivity Mapper — Investigating the atmospheric structure and dynamics of Venus' polar region. *Lunar Planet. Sci. XLIX*, Lunar Planet. Inst., Houston, (abstr.) #2386.
538. Breitenfeld, L.B., and Dyar, M.D. (2018) Calculating mineral Raman Coefficients using a diamond reference. *GeoRaman-8*, p. 26.
539. Breitenfeld, L.B., and Dyar, M.D. (2018) Effect of grain size on Raman signal of silicates. *GeoRaman-8*, p. 121.
540. Dyar, M.D., and Breitenfeld, L.B. (2018) Predicting pyroxene composition with Raman spectroscopy through use of machine learning approaches. *GeoRaman-8*, p. 30.
541. Dyar, M.D., Helbert, J., Maturilli, A., Walter, I., Widemann, T., Marcq, E., Ferrar, S., D'Amore, M., Muller, N., and Srekar, S. (2018) Venus surface oxidation and weathering as viewed from orbit with six-window VNIR spectroscopy. *VEXAG 15*, Abstract #8015.
542. Helbert, J., Dyar, D., Walter, I., Wendler, D., Widemann, T., Marcq, E., Guignan, G., Maturilli, A., Ferrari, S., Mueller, N., Kappel, D., D'Amore, M., Boerner, A., Tsang, C., Arnold, G., Smrekar, S., and Ghail, R. (2018) The Venus Emissivity Mapper (VEM) — Obtaining global mineralogy of Venus from orbit. *VEXAG 15*, Abstract #8023.
543. Lepore, K., and Dyar, M.D. (2019) Temporal changes in LIBS spectra observed using time-series collection protocols. *LPSC L*, Abstract #1095.
544. Watts, J.C., King, J., Mulkahey, C., Tremblay, C., and Dyar, M.D. (2019) Preliminary assessment of the effect of bulk composition on accuracy of Olympus Delta pXRF analyses. *LPSC L*, Abstract #1074.
545. Ytsma, C.R., and Dyar, M.D. (2019) Updated hydrogen, lithium, boron, carbon, and sulfur prediction accuracies with LIBS under vacuum, Earth, and martian atmospheres. *LPSC L*, Abstract #1081.
546. Izenburg, N.R., and Dyar, M.D. (2019) VEXAG Venus Exploration documents 2019 update. *LPSC L*, Abstract #1083.
547. Lepore, K., Ytsma, C., and Dyar, M.D. (2019) Comparisons among laser-induced breakdown spectra from ChemCam, ChemLIBS, and SuperLIBS. *LPSC L*, Abstract #1103.
548. McCanta, M.C., and Dyar, M.D. (2019) Effects of oxidation and shock on pyroxene spectral features. *LPSC L*, Abstract #1383.
549. Ytsma, C.R., Hurowitz, J., and Dyar, M.D. (2019) LIBS and PIXL Prediction accuracies for Ni, Mn, S, and mMajor elements: A comparative study using the same standards. *LPSC L*, Abstract #1080.
550. Dyar, M.D., Ytsma, C.R., and Lepore K. (2019) Standards for geochemical aAnalysis of major, minor, and trace elements in rock powders. *LPSC L*, Abstract #1396.
551. Burbine, T.H., Wallace, S.M., and Dyar M.D. (2019) Applying the Bus-DeMeo asteroid taxonomy to meteorite spectra. *LPSC L*, Abstract #1655.
552. Breitenfeld, L.B., Dyar, M.D., Tremblay, C. (2019) Quantification of mineral abundances in binary mixtures using Raman spectroscopy and multivariate analysis. *LPSC L*, Abstract #1754.
553. Rollososon, L.M., Michaud, D.D., Ytsma, C.R., and Dyar, M.D. (2019) Accuracy of univariate analysis of major, minor, and trace elements in doped samples using SciAps Z-300 portable LIBS, *LPSC L*, Abstract #1077.
554. Michaud, D.D., Rollososon, L.M., Ytsma, C.R., and Dyar, M.D. (2019) Limits of detection for minor and trace elements using SciAps Z-300 Portable LIBS. *LPSC L*, Abstract #1079.
555. Wallace, S.M., Burbine, T.H., Sheldon, D., and Dyar, M.D. (2019) Machine learning applied to asteroid taxonomy based on reflectance spectroscopy: An objective method. *LPSC L*, Abstract #1097.
556. Roberts, S.E., Sheffer, A.A., McCanta, M.C., Dyar, M.D., and Sklute, E.C (2019) Investigating redox change during impacts. *LPSC L*, Abstract #1285.

557. Sklute, E.C., Taylor, E.C., Mikuchi, J.A., Dyar, M.D., and Lee, P.A. (2019) Preliminary FTIR of bioreduction products from the halotolerant and psychrotolerant *Shewanella* strain, BF02, an important astrobiological analogue microbe. *LPSC L*, Abstract #1430.
558. Glotch, T.D., Ye, C., Young, J.M., Londsley, D.H., Nekvasil, H., Dyar, M.D., and Sklute, E.C. (2019) Spectroscopy of synthetic pigeonite standards. *LPSC L*, Abstract #2420.
559. Steven, C.J., Dyar, M.D., McCanta, M.C., Lanzarotti, A., Leight, C., Wagoer, C., Breitenfeld, L.B., and Gunter, M.E. (2019) Toward quantifying oxygen fugacity in Solar System materials: In situ multivalent element analyses in pyroxene. *LPSC L*, Abstract #1393.
560. Orlando, T.M., Clendenen, A.R., Schieber, G.L., Jones, B.M., Loutzenhiser, P.D., Aleksandrov, A.B., Hibbitts, C.A., and Dyar, M.D. (2019) Formation, transport, and release of molecular water on and within lunar materials. *LPSC L*, Abstract #2267.
561. Helbert, J., Dyar, D., Walter, I., Rosas-Ortiz, Y., Widemann, T., Marcq, E., Guignan, G., Maturilli, A., Varatharajan, I., Ferrari, S., Mueller, N., Kappel, D., D'Amore, M., Boerner, A., Tsang, C., Arnold, G., Smrekar, S., and Ghail, R. (2019) The Venus Emissivity Mapper — Obtaining Global Mineralogy of Venus from Orbit on the ESA EnVision and NASA VERITAS Missions to Venus. *LPSC L*, Abstract #2046.

Theses Supervised:

- Reich, D.R. (M.S., University of Oregon, 1989) Geology and Petrology of the Mt. Emily Volcanic Center.
- Hull, C.D. (Ph.D., University of Oregon, 1990) Multicomponent Chemical Equilibrium Modeling of Fluids and U-Th Geochronology of Minerals in Geothermal Systems.
- Harrell, M.D. (Honors College, B.A., University of Oregon, 1991) *In situ* Alteration of a Rock from the Earth's Mantle
- Moeller, K. J. (M.S., University of Oregon, 1991) Crystal Chemistry of Chlorites from Metapelites.
- Grant, C. G. (Ph.D., 1995, Chemistry, University of Oregon) Sources of Experimental and Analytical Error in Measurements of the Mössbauer Effect in Amphibole.
- Taylor, M.E. (M.A., West Chester University, 1996) Crystal Chemistry of Iron in Tourmaline.
- Voci, Christopher (M.A., West Chester University, 1996) Pb Stability in Pyromorphite from Landfills.
- Stefanis, M. (B.A., Mount Holyoke College, 1999) An Interpretation of the Rocks at the Mars Pathfinder Landing Site.
- Polyak, D.E. (B.A., Mount Holyoke College, 1999) Crystal Chemistry of Iron in Plagioclase from Four Heavenly Bodies.
- Blackwell, M.A. (B.A., Mount Holyoke College, 2000) Recoil-free Fraction Effects in Amphibole.
- Lowe, E.W. (B.A., Mount Holyoke College, 2000) Distribution Coefficients for Fe³⁺ and Fe²⁺ in Metapelites from Western Maine.
- Cartwright, B.M. (M.S., University of Massachusetts, 2003) Plagioclase Fe³⁺/Fe²⁺ Correlation with Magma Oxygen Fugacity in a Volcanic Succession: The Atascosa Mountains, South-central Arizona. Co-supervised with Sheila Seaman.
- Makuch, L.B. (B.A., University of Massachusetts, 2002) The Ares Project. Honors College.
- Therkelsen, J.B. (B.A., Amherst College, 2002) Shock-induced changes in redox state of experimentally shocked plagioclase, pyroxene, and olivine.
- Peek, K.M. (B.A., Mount Holyoke College, 2002) The disruption of an icy satellite and the evolution of the resulting debris ring. A formation scenario for Saturn's rings.
- Dickson, J. (B.A., Hampshire College, 2002) Water on Mars: A synthesis of hydrologic features on the surface of Mars.
- Daane, A.R. (B.A., Mount Holyoke College, 2004) Brightness and color variations in the hot pulsating horizontal branch star PG1627+017.
- Hunter, M.O. (B.A., Mount Holyoke College, 2004) Pacific Equatorial Current systems during the waning of the 2002-2003 El Niño.

- O'Connor, V. (B.A., Smith College, 2005) Comparative crystal chemistry of hydrous iron sulfates from different terrestrial environments.
- Dopfel, E. (B.A., Mount Holyoke College, 2006) The chemical activators of cathodoluminescence in jadeite.
- Sklute, E.C. (B.A., Mount Holyoke College, 2006) Mössbauer spectroscopy of synthetic olivine across the Fe-Mg solid solution.
- Rothstein, Y. (B.A., Mount Holyoke College, 2006) Spectroscopy of jarosite and implications for the mineralogy of Mars.
- Howenstine, J. (B.A., University of Massachusetts, 2006) Analysis of depth-diameter relationship of martian craters.
- Bendersky, C. (B.A., Mount Holyoke College, 2007) The onset of thermal metamorphism in enstatite chondrites.
- Walker, C.A. (B.A., Mount Holyoke College, 2007) Variations of solar wind parameters over a solar cycle: Expectations for NASA's Solar Terrestrial Relations Observatory (STEREO) Mission.
- Graham, S. (B.A., Mount Holyoke College, 2007) GPS geodetic constraints on the November 21, 2004 Mw 6.3 earthquake off the northwest coast of Dominica: implications for in situ volatile solubilities and eruptions dynamics.
- Barkley, M. (B.A., Mount Holyoke College, 2007) The effects of F-OH⁻ substitution on the crystal structure of pegmatitic topaz.
- Cadieux, Sarah Beth (B.A., Mount Holyoke College, 2008) Carbon-isotope stratigraphy of Upper Cretaceous deposits of the Dalmatian Island of Brač, Croatia.
- Langford, Amy (B.A., Mount Holyoke College, 2008) Unbiased search for molecular outflows in the Taurus Molecular Cloud.
- Emerson, Erica (B.A., Mount Holyoke College, 2008) Analysis of iron oxidation in garnets.
- Tucker, Jonathan (B.A., Amherst College, 2009) Calibrating ChemCam: Preparing to Probe the Red Planet.
- Knutson, J.K. (B.A., Mount Holyoke College, 2010) Exploring biotite iron transformation by the hyperthermophilic archaeon *Pyrobaculum Islandicum*.
- Barbieri, Lindsay (B.A., Hampshire College, 2010) Deciphering Late-Amazonian climate change on Mars using evidence preserved in gully fan stratigraphy.
- Bell, S. (B.A., Amherst College, 2011) Fresh lunar crater ejecta as revealed by the Miniature radio Frequency (Mini-RF) instrument on the Lunar Reconnaissance Orbiter.
- Ozanne, M.V. (B.A. Mount Holyoke College, 2012) Comparison of shrunken regression methods for major elemental analysis of rocks using laser-induced breakdown spectroscopy (LIBS).
- DeVeaux, M.L. (B.A. Mount Holyoke College, 2012) Evaluation of statistical methods for classification of laser-induced breakdown spectroscopy (LIBS) data.
- Williams, Molly (B.A., Mount Holyoke College, 2012) Characterizing Fe(III) transformation in a deep-sea hyperthermophilic archaeon.
- Kashyap, Srishti (B.A., Mount Holyoke College, 2013) Isolating and characterizing an Fe(III) transforming deep sea thermophilic archaeon.
- Breitenfeld, Laura (B.A., Mount Holyoke College, 2017) Predicting olivine composition using Raman spectroscopy through band shift and multivariate analyses.
- Ytsma, Caroline (B.A. Smith College, 2018) Univariate and multivariate quantification of hydrogen, lithium, boron, carbon, and sulfur under vacuum and in Earth and Mars atmospheres using laser-induced breakdown spectroscopy.
- Carey, CJ (Ph.D., University of Massachusetts, 2018) Graph construction for manifold discovery.
- Boucher, Thomas (Ph.D., University of Massachusetts, 2018) Transfer learning with mixtures of manifolds.

Graduate Committees:

McCanta, Molly (Ph.D., Brown University, 2004)

Buczowski, Debra (Ph.D., University of Massachusetts, 2006)
Keskula-Snyder, Anna (Ph.D., University of Massachusetts, 2006)
Klima, Rachel (Ph.D., Brown University, 2007)
Amy Stander (MS, URI, 2013)
Tommy Boucher (Ph.D., UMass, 2018 Computer Science)
C.J. Carey (Ph.D., UMass, 2017, Computer Science)
S. Giguere (Ph.D., UMass, current student, Computer Science)
S. Kashyap (Ph.D., UMass, current student, Microbiology)

EXTERNAL GRANT:

PREVIOUS FUNDING:

American Chemical Society, Petroleum Research Fund:

"Cation Ordering in Synthetic Trioctahedral Micas"
\$18,000 funded, 7/1/87-8/31/89
\$4,500 supplement, 5/1/88-9/30/88
\$2,500 supplement, 5/1/89-7/1/89
"Detailed Crystal Chemistry of Iron-Bearing Phyllosilicates"
\$40,000 funded, 5/1/91-8/31/93
\$3,000 supplement, 6/1/91-9/30/91

National Science Foundation, Earth Sciences Division:

"Crystal Chemistry and Petrogenesis of Biotites from Pelitic Schists"
\$60,000 funded, 7/1/87-6/30/90
"Crystal Chemistry of Metapelitic Minerals in a Petrologic Context"
\$50,226 funded, 1/1/89-12/31/90
"Crystal Chemistry of Hydrogen and Oxygen in Common Phyllosilicate Minerals"
\$61,774 funded, 1/1/92-12/31/93
"Development of Standards for Light Element Analysis in Geological Materials: Collaborative Research"
\$ 21,639 funded, 6/1/93-12/31/95
"The Boron Budget in High-Grade Pelitic Metamorphic Rocks: How, When, and Where does the Boron Go?" (Joint with C.V. Guidotti and E.S. Grew)
\$56,333 funded for period 1/1/96-12/31/97
"Hydrogen Partitioning and Fe³⁺ Exchange in Mantle Minerals: Effects on Mechanical Behavior - Collaborative Research" (Joint with S.J. Mackwell)
\$142,997 funded for period 11/1/93 to 5/31/98
\$5,000 supplement funded for 5/1/94 to 9/1/94
"Redox Processes in Rio Grande Rift and Colorado Plateau Xenoliths: Collaborative Research" (Joint with A.V. McGuire)
\$55,598 funded for period 6/1/94-5/31/98
\$7,000 supplement funded for 5/1/95 to 9/1/95
"Synchrotron MicroXANES Study of Iron Redox in Mantle Phases"
\$60,000 funded for period 8/15/98 - 2/28/01
"R.U.I.: Acquisition of a New Mössbauer spectrometer"
\$49,840 funded for period from 3/1/99 - 2/28/01
"R.U.I.: Collaborative Research: Chemical Equilibria Involving Iron and Hydrogen in Metapelites from Western Maine"
\$27,468 funded for period from 8/1/99 - 7/31/01
"RUI: Acquisition of a Scanning Electron Microscope at Mount Holyoke College"
\$226,560 funded for period from 6/1/02-5/30/03

“RUI: Collaborative Research: Hydrogen and Ferric Iron in Felsic Melts”

(collaborative with Sheila Seaman, University of Massachusetts)

\$86,000 funded for period from 1/1/03-12/31/06

“RUI: Collaborative Research: Improvements in the Application of the Mössbauer Effect to Studies of Minerals”

(collaborative with Martha Schaefer, LSU)

\$76,939 funded for period from 1/1/05-12/31/08

“Redox Ratios by Fe-XANES”

(collaborative with M. Gunter and A. Lanzirotti)

\$104,897 funded for period from 6/1/08-5/31/11

“Effects of Composition and Cooling Rate on Fe XANES Glass Calibrations”

(Collaborative with Molly McCanta at Tufts University)

\$115,363 funded to MHC for period from 8/1/12 – 7/31/15

National Science Foundation, Division of Computation and Data-Enabled Science and Engineering:

“Transfer Learning for Chemical Analyses from Laser-Induced Breakdown Spectroscopy”

(Sridhar Mahadevan, UMass, Co-I)

\$141,129 to MHC for period from 9/1/13 – 8/31/15

National Science Foundation, Division of Undergraduate Education:

"Undergraduate Research Program in Materials Science"

\$14,500 funded, 5/1/88-9/30/88

"Undergraduate Research Program in Materials Science"

\$36,600 funded, 5/1/89-12/31/89

"Equipment for Program Improvement in Mineralogy/Petrology"

\$45,000 funded, 1/1/89-12/31/89

\$40,000 match from University of Oregon

\$7,500 match from I.B.M. and Novell

“Support for Development of Minerals and Mineralogy: A Three-Dimensional Approach”

\$75,000 funded for period from 3/1/00 - 2/28/02

“A Modular, Inquiry-Based Regional Approach to Introductory Laboratories”

(S. Good, C.G. Fisher, R.M. Busch, T.M. Lutz, L. Srogi, and C.G. Wiswall, Co-I's) NSF grant DUE-9850923, \$40,800 funded, 6/1/98-5/31/2000.

“An Integrative Curriculum in Earth, Human, and Environmental Sciences

(Joint with L. Savoy, M.J. Markley, A. Werner, M.A. McMenamin, S. Dunn, and T. Millete)

\$170,000 funded for period from 1/1/00 - 6/30/05

“Support for Development of Minerals and Mineralogy: A Three-Dimensional Approach”

\$417,244 funded for period from 3/1/02 – 2/28/08

“An Integrative Curriculum in Planetary Science”

(C.M. Hamilton, T. Burbine, co-Is)

\$91,900 funded for period from 9/1/05 – 8/31/07

“Scaffolding Effective Practice for Use of Animations in Teaching Mineralogy and Physical Geology”

(M. Gunter and L. Wenk, Co-I's)

\$150,000 funded for period from 1/1/09 -12/31/10

“Building Analytical Competence for Geoscience Students through use of Spectroscopic Tools”

(Collaborative with John B. Brady and Eileen McGowan)

\$73,375 funded to MHC for period 8/15/12-7/31/15

National Science Foundation Scholarships in Science, Technology, Engineering, and Mathematics

“Improving Recruitment and Retention of Transfer Students to STEM Majors at Mount Holyoke College”

(Sarah Bacon and Becky Packard, Co-Is)

\$600,000 for period from 1/1/12-12/31/16

Packard Foundation

“Earth and Environmental Sciences in California and the Southwest” (Joint with A. Ellison, L. Savoy, and T. Millette)

\$200,000 funded for period from 1/1/00 - 12/31/02

Tektronix Foundation:

"Request for Upgrade to Mössbauer Spectroscopy Laboratory"

\$4,000, 1987; \$6,000, 1988; \$10,000, 1989

NASA, Cosmochemistry Division:

“Synchrotron microFTIR characterization of hydrogen in nominally anhydrous minerals in martian materials.”

\$68,000 funded for period from 1/1/01 - 12/31/02

“Ferric Iron and Hydrogen in Mars Minerals”

\$45,000 funded for period from 1/1/03 - 12/31/03

“Acquisition of a 4.5K Mössbauer Spectrometer”

\$35,345 funded for period from 1/1/05 to 12/31/06

NASA, Exobiology Program:

"Biogenic iron oxide transformations by thermophilic and mesophilic iron-reducing microbes"

James Holden, University of Massachusetts, PI

\$208,316 to MHC for period from 4/1/14-3/31/18

NASA, Mars Fundamental Research Program:

“Temperature Dependence and Resolution of Fundamental Mössbauer Parameters in Mars-Analog Minerals”

\$150,000 funded for period from 10/1/02 – 9/30/06

“Taking Apart the Rocks of Mars” (C. Pieters, P.I., J. Bishop, J. Sunshine, T. Hiroi, Co-Is)

NNG04GB53G

\$60,000 funded for period from 12/31/03 – 11/30/06

“Analysis and Characterization of Sulfates and Sulfides Using Multiple Spectral Techniques (M. Lane, P.I., J.L. Bishop, Co-I)

\$31,000 funded for period from 1/1/05-12/31/06

“Temperature Dependence and Resolution of Fundamental Mössbauer Parameters in Mars-Analog Minerals”

(collaborative with M. Schaefer, LSU)

\$90,000 funded for period from 3/1/06-2/28/09

“Mineral Standards and Technique Development for Laser-Induced Breakdown Spectroscopy”

\$375,000 funded for period from 3/1/06-2/28/09

“Formation of Magnetic Minerals on Mars by Alteration of Nanophase Ferric Oxides/Oxyhydroxides” (Janice Bishop, SETI/Ames, PI)

\$30,000 funded for period from 3/1/06-2/28/09

“Further Analysis and Characterization of Sulfates and Sulfides Using Multiple Spectral Techniques” (collaborative with Melissa Lane, Planetary Science Institute (PI), and Janice Bishop, SETI)

\$32,000 funded for period from 3/1/06-2/28/09

“Characterizing the Rocks of Mars through Integrated Spectroscopy”

(collaborative with C. Pieters (PI), J. Bishop, M. Lane, T. Hiroi, J. Sunshine)

\$60,000 to MHC for period from 3/1/07 – 2/28/11

“Analysis and Characterization of Phosphates Using Multiple Spectral Techniques”

- (collaborative with Melissa Lane (PI), Planetary Science Institute, and Janice Bishop, SETI)
\$45,947 funded for period from 3/1/08-2/28/12
- “The State of Sulfur on Mars: Understanding the Interrelationships Among the Crystal Structure, Chemistry, and Spectroscopy of Sulfates and Sulfides “
(collaborative with Melissa Lane (PI), Planetary Science Institute, and Janice Bishop, SETI)
\$97,754 funded to MHC for period from 6/1/10-5/31/13
- “Technique Development for Laser-Induced Breakdown Spectroscopy: Calibration, Classification, and Light Element Analysis”
(collaborative with Sam Clegg and Roger Wiens, LANL, and Martha Schaefer)
\$719,000 funded for period from 3/1/09 – 5/30/14
- “Effects of Shock Metamorphism on Phyllosilicate Spectroscopy”
(Joseph Michalski, P.I.)
\$67,941 funded to MHC for period from 6/1/10-5/31/14
- “Impact History and Meteoritic Contributions to the Martian Upper Crust”
(collaborative with Caleb Fassett, PI)
\$261,888 funded to MHC for period 6/1/14-5/31/18
- “Transfer learning for chemical analyses from laser-induced breakdown spectroscopy on the surface of Mars”
(collaborative with Sridhar Mahadavean)
\$445,093 funded to MHC for period 11/29-14-11/30/17

NASA, Lunar Advanced Science and Exploration Research Program:

- “Thermodynamics, VIS-IR Spectroscopy, and Mapping of Adsorbed Water on the Moon”
(K. Hibbitts, PI)
\$33,920 to MHC for period from 6/1/08 – 5/31/09
- “Pyroxene Spectroscopy as a Tool to Probe the Composition and Thermal History of the Lunar Surface”
(Rachel Klima, PI)
\$104,914 to MHC for period from 1/1/10 – 5/31/13
- “The Stability and Transport of Water on the Moon”
(Karl Hibbitts, P.I.)
\$106,614 funded to MHC for period from 9/1/11-6/30/15
- “Solar Wind Induced Production of Hydroxyl and Water on the Moon”
(Thomas Orlando, PI)
\$9,313 to MHC for period from 9/1/11-6/30/15

NASA, Mars Science Laboratory Participating Scientist Program:

- “Enhancing Science Return from ChemCam through Laboratory and Statistical Analyses and Integration with APXS”
\$476,885 for period from 2/15/12-12/31/16

NASA, Lunar Science Institute Program:

- “The Moon as Cornerstone to the Terrestrial Planets: The Formative Years”
C.M. Pieters, PI, Brown University
\$135,000 funded to MHC for period from 4/9/09 – 4/8/14

NASA Planetary Geology and Geophysics Program:

- “Integrated Spectroscopy of Pyroxenes: Composition, Structure, and Thermal History”
(Rachel Klima, PI)
\$32,711 to MHC for period from 8/5/11-8/4/14
- “Pyroxene Spectroscopy, Composition, Structure, and Thermal History”
(Rachel Klima, PI)

\$91,313 to MHC for period from 6/1/13 – 5/31/16

NASA Solar System Workings Program:

“SuperCam-Analog Laser-induced Breakdown Spectrometer at Mount Holyoke College”

\$445,095 for period 10/1/16-9/30/18

CURRENT FUNDING:

NASA, Solar System Exploration and Research Virtual Institute Program:

“Remote, In Situ, and Synchrotron Studies for Science and Exploration”

Tim Glotch, Stony Brook Univ., PI (**Dyar is Deputy PI**)

\$777,256 to MHC for period from 1/1/14-12/31/18

“Volatiles, Regolith and Thermal Investigations Consortium for Exploration and Science (VORTICES)”

Ben Bussey, APL, PI

\$51,998 to PSI for period from 1/1/14-12/31/18

“Environment and Evolution of Exploration Destinations: Science and Engineering Synergism”

Carle Pieters, Brown Univ., PI

\$135,600 to MHC for period from 1/1/14-12/31/18

“TREX: Toolbox for Research and Exploration”

Amanda Hendrix, PSI, PI

\$5,483,517 to PSI 6/1/17 – 5/31/22

NASA, Exobiology Program:

"ICE-MAMBA Ice-covered Chemosynthetic Ecosystems: Mineral Availability and MicroBiological Accessibility"

Jill Mikuchi, Univ. of Tennessee, PI

\$208,316 to PSI for period from 1/22/17-1/21/20

“Fe(III) Oxide Reduction by a Hyperthermophilic Crenaraeon: Novel Mechanisms and Detection”

James Holden, Univ. of Massachusetts, Amherst, PI

\$230,236 to Planetary Science Institute for period from 10/1/18 – 9/30/21

NASA Emerging Worlds Program:

“Volatile Adsorption onto Primitive Grains for Understanding the Formation of the Early Solar System”

Karl Hibbitts, PI

\$13,858 to PSI for period from 3/1/5-2/28/18

NASA Solar System Workings Program:

“Oxidation State of Lunar Glasses: Implications for Surface and Eruptive Processes on the Moon”

Molly McCanta, PI

\$136,530 to PSI for period from 10/1/16-3/30/19

“Towards Quantifying Oxygen Fugacity in Solar System Materials: In Situ Multivalent Element Analyses in Pyroxene”

Molly McCanta, PI

\$267,184 to Dyar for period from 10/1/18 – 9/30/21

NASA Planetary Data Archiving, Restoration, and Tools:

“Advanced XAS Calibration Tools for In Situ Analysis of Redox States of Fe, Ti, Mn, Cr, V, and Eu in Extraterrestrial Glasses”

\$208,997 to PSI for period from 1/15/17-1/14/20

NSF Information Integration and Informatics

“Collaborative Research: Deep Learning for Spectroscopy”
Collaborative with Sridhar Mahadevan and Mario Parente
\$373,793 to MHC for period from 4/1/16-3/31/20

NSF Petrology and Geochemistry:

“Refining Geothermobarometry in Pyroxenes using In Situ Measurements of Fe^{3+} ”
\$172,000 fto MHC or period from 7/1/18 – 6/30/2101

NSF Planetary Astronomy:

“Formation, Stability, and Detection of Amorphous Ferric Sulfate Salts on Mars”
Elizabeth Sklute, PI
\$232,273 to MHC for period from 10/1/18 – 9/30/21

EXHIBIT B

Previous Four Years of Expert Testimony for Melinda Darby Dyar, Ph.D.

Dr. Melinda Darby Dyar has not testified as an expert at trial or by deposition during the previous four years.

Exhibit J



Amphibole Content of Cosmetic and Pharmaceutical Talcs

by A. M. Blount*

Pharmaceutical and cosmetic-grade talcs were examined for asbestiform amphibole content using a new density-optical method. Talcs under the Food and Drug Administration are not regulated as to asbestos content; however, all talcs were well below the level mandated by the Occupational Safety and Health Administration for industrial talcs. Only one was found to contain an amphibole particle size distribution typical of asbestos.

Introduction

In 1973 the Food and Drug Administration (FDA) proposed a regulation on the permissible asbestos content of talc (1). This regulation proposed to limit the amount of amphibole minerals to less than 0.1% and chrysotile to less than 0.01%. However, the optical microscopy method proposed was so complicated, lengthy, and subject to error that the proposed method was never finalized. Since then no final ruling has been issued.

The Occupational Safety and Health Administration, on the other hand, has been more rigorous and has instituted regulations despite the lack of methods to carry out the required measurements. One regulation, instituted in 1986, defines amphibole minerals as asbestos if the length to width ratio is 3:1 or greater. Because many nonfibrous cleavage fragments of amphibole minerals have a 3:1 aspect or greater and because there is no good evidence for adverse effects of these particles, a stay has been in effect on this part of the regulation (2). The second applicable regulation is the Hazard Communication Regulation (3), which applies to all chemicals used in the workplace. Specifically, it requires labeling of substances containing > 1% of a chemical hazardous to health and > 0.1% of a carcinogenic chemical.

Unfortunately, asbestos and amphiboles cannot be measured using currently developed methods to the level of 0.1% in the presence of talc. Some investigators have suggested that tremolite can be measured to that level by X-ray diffraction. But others have shown that the peak intensities vary between nonfibrous and fibrous tremolite (4) so that the 0.1% level of detection and measurement is doubtful except in cases where the sample has been spiked so that the exact nature of the tremolite is known. For anthophyllite there is little argument about the fact that detection cannot be made to 0.1%. However, the main problem with using X-ray diffraction for detection of amphibole minerals is that it gives no information about the shape of the particles, and shape is important in view of the uncertainty in the outcome of the asbestos regulation pertaining to nonfibrous amphiboles.

The talcs that are pharmaceutical grade fall under the domain of the FDA and are therefore nonregulated in regard to fibrous mineral content. In the course of developing a technique to facilitate quantification of amphiboles in talc (5), pharmaceutical and high-grade talcs were examined. They were found to have very low amphibole content and, because of this, were extensively used in examining the lower limit of detection of the new method. The purpose of this paper is to describe the results of analyses for content and shape of amphibole mineral fragments in cosmetic and pharmaceutical talc powders of the United States.

Methods

The method proposed by the FDA in 1973 for analysis of talc was an optical procedure as described below (1):

Weigh out 1 milligram of a representative portion of talc on each of two microscope slides. Mix the talc with a needle on one slide with a drop of 1.574 refractive index liquid, and then the other with 1.590 liquid, and place on each a square or rectangular cover glass sufficiently large so that the liquid will not run out from the edge (ca. 18 mm square) and will provide a uniform particle distribution. Fibers counted by this method should meet the following criteria: (i) Length to width ratio of 3 or greater (ii) length of 5 μ m or greater (iii) width of 5 μ m or less. Count and record the number of asbestos fibers in each 1 milligram as determined from a scan of both slides with a polarizing microscope at a magnification of approximately 400 \times . In the 1.574 refractive index liquid, chrysotile fibers with indices less than 1.574 in both extinction positions may be present: in the 1.590 refractive index liquid, the other five amphibole types of asbestos fibers with indices exceeding 1.590 in both extinction positions may be present. Check the extinction and sign of elongation for tentative identification. For specific identification of asbestos fibers, make additional mounts in appropriate refractive index liquids, and refer to the optical crystallographic data in the table. A count of not more than 1000 amphibole types of asbestos and not more than 100 chrysotile asbestos fibers per milligram-slide constitutes the maximum limit for the presence of these asbestos fibers in talc. These limits assure a purity of at least 99.9 percent free of amphibole types of asbestos fibers and at least 99.99 percent free of chrysotile asbestos fibers.

The problem with the proposed method is that talc flakes are often oriented vertically or at a sufficient angle that they appear to be needles and thus must be tested for refractive index (Fig. 1). A typical number of such particles is five per field of view. This

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FIGURE 1. Talc flakes in 1.584 refractive index liquid. Note that there are particles in this field that have aspect ratios greater than 3:1. Width of view 0.13 mm.

means that some 20,000 particles would need to be examined in a typical case. In addition, chlorite is often present and when on edge must be examined in two extinction positions. This is clearly beyond what could be expected of any sane microscopist for a routine analysis. Since no other procedure has been developed as an alternative, a compromise has been to count 100 fields of view (FOV). In this way one need only examine about 500 particles in detail.

Because 500 particles is still a lengthy process, a more rapid and equally accurate method has been developed based on concentrating the amphibole particles by density difference. Figure 2 illustrates that there is a distinct break in density ranges between talcs and amphiboles. A heavy liquid of intermediate density is used, either Klein's (cadmium borotungstate) or Clerici's (thallium formate-malonate) solution. Experimentation showed that a heavy liquid of density 2.810 gives good separation even though values given in the literature and shown in Figure 2 would suggest that the density should be slightly higher. Because the density difference between particles and liquid is small, to get separation in a reasonable length of time a microcentrifuge is used with tubes containing 1.5 mL liquid. The height of the liquid column is, in this case, about 10 mm.

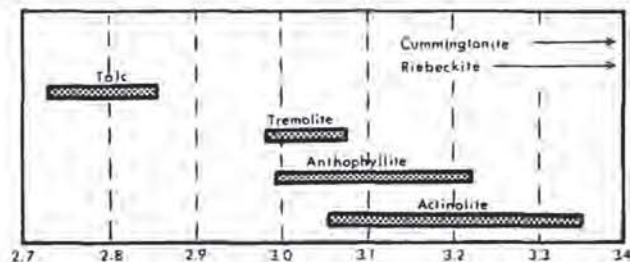


FIGURE 2. Specific gravities of talc and amphibole (6).

The general procedure involves weighing about 60 mg sample into a microcentrifuge tube and adding heavy liquid of density 2.810. After these are mixed, the tube with sample is placed in a vacuum for 3 min to remove the small bubbles adhering to the particles. After centrifuging the sample for 10 min at 7000 rpm, the heavy particles are removed from the bottom of the tube with a micropipette.

The counting of particles can be done either on a membrane filter (Nuclepore, 1.0 μ m pore size) which has been placed on a microscope slide or as particles directly on the glass slide. In the first case, the heavy liquid with sample is forced through a membrane filter followed by distilled water to clean out the heavy liquid. The filter is then placed on a glass slide while wet. When dry, 1.584 refractive index liquid is placed on the filter followed by a cover glass. The photographs shown in this paper are of particles on filters.

The second case, particles directly on the microscope slide, requires transferring the heavy particles and some of the heavy liquid to a second centrifuge tube. Distilled water is added and the sample centrifuged. The liquid is pipetted off and more distilled water added. This is repeated several times to clean out the heavy liquid. Finally, the particles with several drops of water are transferred to a glass microscope slide. The advantage of this procedure is that any refractive index liquid can be used, whereas, in the former case, the refractive index is constrained by having to match the index of the membrane filter (either 1.584 or 1.625). The 1.584 value is good for analyzing amphiboles in talc, but the centrifuge method described has application to other mineral combinations, such as talc-quartz. With other combinations, refractive indices other than the two exhibited by the membrane filter may be more appropriate.

The particles are counted in 20 FOV. Being concentrated from 60 mg or more of sample, one will see more amphiboles than in 100 FOV using the old method. The number of amphibole particles per milligram (ppmg) is calculated:

$$\text{ppmg} = \frac{\text{amphibole particles/mg}}{(\text{number of amphibole counted/number FOV counted}) \times \text{total number FOV}} \times (\text{efficiency}) \times (\text{number of mg of sample})$$

Efficiency of the spin-down is determined experimentally. For more details of the method see Blount (5).

Figure 3 illustrates the results obtained when testing the method using known mixtures. Because it is difficult to measure and mix in very small weights of amphibole, a sample containing 2% tremolite in talc was mixed with pure talc to make mixtures containing very low percentage values of tremolite. For example, sample A (Fig. 3) consisting of 0.06% tremolite was made by weighing 58.9 mg of pure talc with 1.7 mg of talc containing 2% tremolite ($1.7 \text{ mg}/60.6 \text{ mg} \times 2\% = 0.06\%$). It is not necessary to make a homogeneous mixture since the entire sample was used in the experiment. Also, the talc containing amphibole was put in the tube second in order not to give the amphibole any "head-start" in sinking to the bottom.

The centrifuge method was also tested with a commercial talc. 100 FOV were counted in ten 1-mg samples according to the FDA procedure for amphibole. This was compared with 20 FOV counts on 60-mg centrifuge samples (Fig. 4). The agreement is quite good. The standard deviations were determined in two

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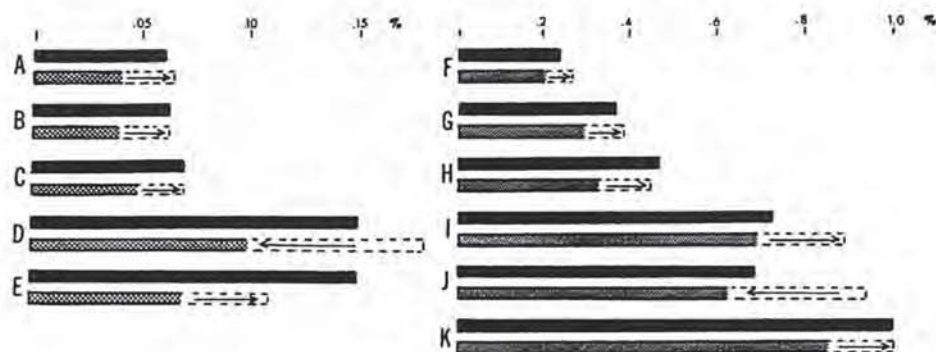


FIGURE 3. Percent tremolite in talc as determined by the centrifuge/optical method (shaded bars) compared with that actually present in experimental mixtures (black bars). The dashed part of the shaded bars indicates +2 SD (right arrow) or -2 SD (left arrow).

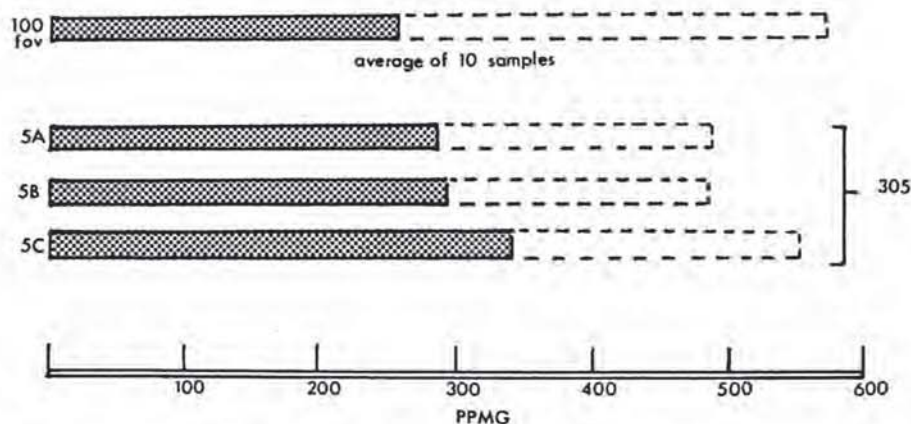


FIGURE 4. Comparison of traditional (100 FOV) count with centrifuge/optical count of same talc. The three lower bars indicate the values in particles/mg obtained by the centrifuge/optical method for three 60-mg samples. The top bar is the average of ten 100 FOV (traditional method). The dashed part of all the bars is +2 SD.

ways: for the traditional method by calculating in the usual way from multiple analyses and for the centrifuge method by means of the Poisson distribution from single counts. Standard deviations are high for the centrifuge method because of the very few particles counted. These could be decreased by making a larger count, but since the purpose of the study was to find a reasonably rapid method of monitoring amphibole content of talcs, larger counts were not generally made.

Results

High-grade talc products from five deposits in Montana, three in Vermont, and one each in North Carolina and Alabama were examined using the centrifuge/optical method. In addition, four talcs from outside the U.S. but available in the U.S. market were included in this study. Talcs from other districts in the U.S. were examined, but these talcs had grades with less stringent requirements and are not included in this report.

Results of particle counts are shown in Table 1. The FDA has equated 0.1% with 1000 particles per milligram. In order for amphibole particle content to be less than 0.1%, 20 or less particles must be observed in 20 FOV (5). Since all were well below this

value, more extensive counts were not generally made.

It should be borne in mind that the 0.1% indicated is percent by count and not percent by weight or volume. The question of the validity of this relation has been considered (5). Briefly, the relation implies (1000 amphibole particles)/(1,000,000 total particles). Counts of total particles per milligram of talc have shown that 1 million particles per milligram of talc is a low value. Most show at least 2 to 3 times this number. The only exception was a baby powder with very large flakes which showed 0.4 to 0.8 million particles per milligram. It was not clear, however, whether this was a true value or due to the problem of counting where large, flakey particles could potentially hide other particles even in the most carefully prepared samples. Using 1000 particles/mg = 0.1% would, in most samples, give a percentage value on the high side and in this sense be a conservative answer.

The counts shown in Table 1 were made of regulatory fibers i.e., aspect ratio > 3:1. In some samples there were as many or more nonregulatory particles of amphibole as regulatory fibers. The shape of the amphibole varies greatly and seems to be highly characteristic of each deposit. In Table 1, the particles having aspect ratios less than 6:1 are designated cleavages and prismatic pieces. Those greater than 6:1 and less than 15:1 are labeled

Table 1. Counts of regulatory fibers in processed talcs.

Sample	Counts, particles/mg	SD	Particle shapes	Particles/FOV*
A	38	25	Cleavages	3/100
B	ND ^b			0/20
C	ND			0/20
D	< 25 ^c		Cleavages	0/20
E	ND			0/20
F	ND			0/20
G	ND			0/20
H	17	17	Cleavages and needles	2/20
I	226	59	Needles and fibers	17/20 ^d
	283	100	Needles and fibers	8/20
	291	98	Needles and fibers	9/20
	341	108	Needles and fibers	10/20
	102	51	Needles and fibers	3/20
J	25	14	Cleavages	1/20
	27	27	Cleavages	3/20
K	25	25	Cleavages	1/20
L	< 10 ^c		Needles	0/20
M	39	21	Cleavages and fibers	4/20
N	25	17	Prismatic pieces	3/20
O	ND			0/20

*FOV, fields of view.

^bND, none detected.^cNo particles seen during a 20 FOV count, but some particles could be seen during a random scan of the filter. Value shown is the lower limit of detection.^dLarge sample used for this analysis (305 mg).

"needles." The remainder, which are greater than 15:1, are labeled "fibers." Whereas in many samples only a few particles were counted as shown in the right-hand column of Table 1, it should be remembered that even if only one particle was present in 20 FOV that about 300 were present on the slide. Because of the low interference by talc particles, these were seen so that it was easy to get a sense of the general particle shape.

The shape distribution of particles for several samples was determined. Figure 5 shows a photograph of a particle of tremolite in sample *I*. The particle is composed of fibrils. The length and width of 100 amphibole particles in this talc were measured. The resulting distribution of aspect ratios is shown in Figure 6. The results when compared with the aspect ratios determined for tremolite asbestos with SEM by Campbell et al. (7) show sample *I* has a distribution similar to asbestos. Sample *M* was analyzed in the same way (Figs. 6 and 7). The graph of aspect ratio versus percent is compared with Campbell's results for nonfibrous tremolite. The similarity of the curves indicates that the tremolite in this talc is of the nonfibrous type.

Because the fractions produced by centrifuge are not generally pure after a single spin-down, a sample containing a variety of particle shapes was tested to see if the aspect ratio distribution results become biased in favor of larger, chunky grains (low aspect ratio) over small, long grains (high aspect ratio). The sample used contained 6.5% tremolite, a sufficient quantity that the traditional optical method could be used to compare with the centrifuged sample. The resulting aspect ratio distribution curves (Fig. 8) do not show significant differences. With the traditional method, 69% of the amphibole particles have an aspect ratio of 3:1 or greater, whereas for the centrifuged samples the value is 64%, a variation which is not significant. The differences shown for 5:1 and 10:1 are probably due to the limited number of particles measured, in this test 100 particles in each sample.

Despite the similarity of the curves, the mean length and mean width of the amphibole particles measured using the centrifuge method are greater than those obtained using the traditional method (Table 2). Analysis of size distribution indicates that the proportion larger than 15 μm is greater in the centrifuged sample. This difference in dimension distribution does not appear, however, to affect the aspect ratio distribution. Other investigators have found that as particles increase in length, the aspect ratio shifts to higher values (8,9). This applies to both asbestos and nonasbestiform amphiboles, so presumably the effect of centrifuging down longer particles would be to force the aspect ratio distribution peak to higher values.

Discussion

The high-grade talc powders are uniformly low in amphibole content. Counts obtained were 0 to 341 particles/mg. Indeed, talc from some districts appears to be completely free of such minerals. In those containing amphibole minerals there are two distinct types: cleavage type and asbestos type. These two types show distinctly different aspect ratio distributions as demonstrated in Figure 6 (samples *I* and *M*). The aspect ratio difference probably accounts in a large part for the higher particle count per milligram of sample *I* compared with the others which show cleavage fragments. It is easy to see that the number of particles showing greater than 3:1 aspect ratio would be greater in the former case even if the total number of particles of amphibole were equal. This observation reinforces the original decision to count particles visually rather than attempting to use X-ray diffraction. It is not wise to try to convert information on dimensions to percent by weight or volume because a few very large particles can drastically affect the resulting value. Campbell et al. (8) discuss this in some detail.

FIGURE 5. Particle of amphibole in centrifuged sample *I*. Width of view 0.07 mm and 1.584 refractive index liquid. Particle is on a membrane filter.

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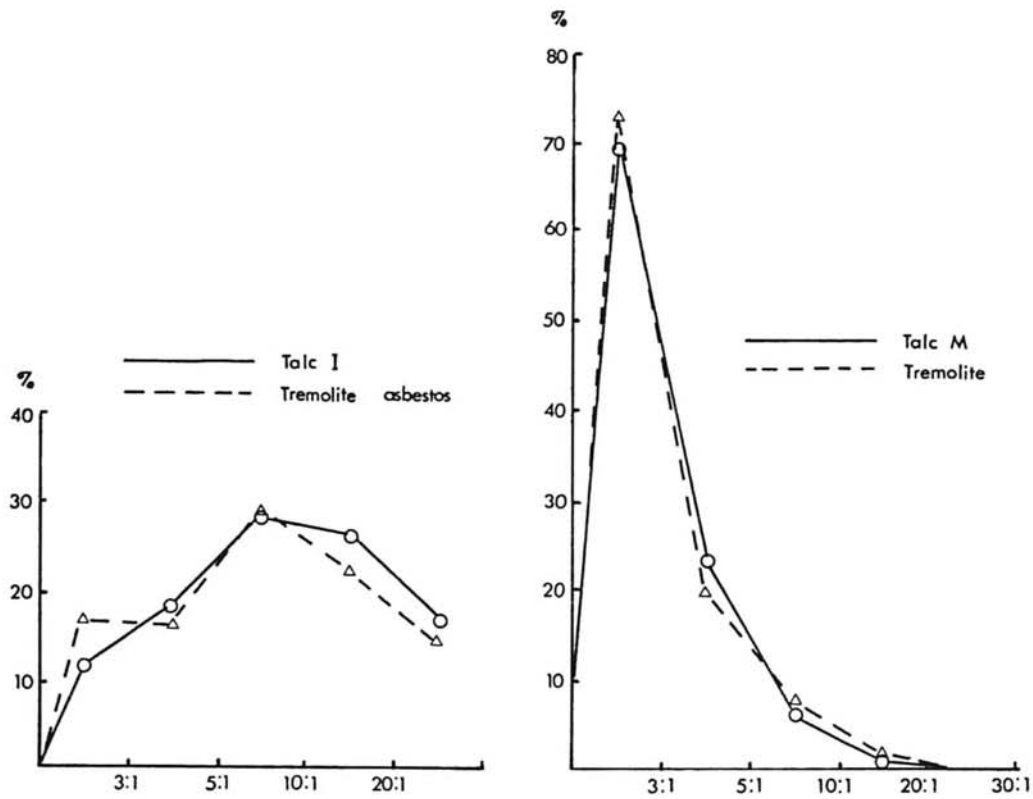


FIGURE 6. Percent amphiboles in each aspect ratio group for talc sample *I* (left) and *M* (right) compared with tremolite asbestos (7) and tremolite (nonasbestiform) (7).

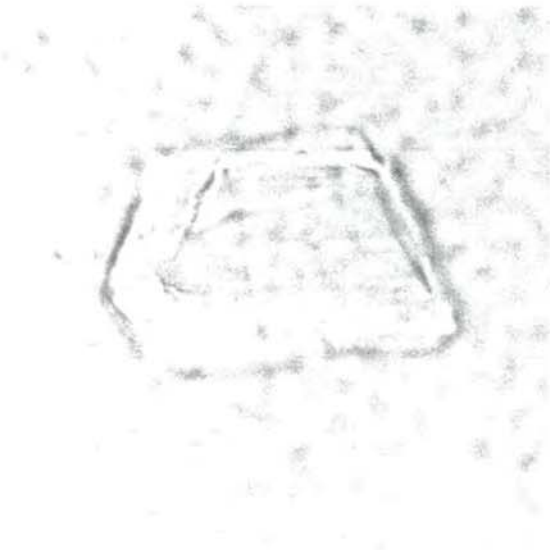


FIGURE 7. Particle of amphibole in centrifuged sample *M*. Width of view 0.07 mm and 1.584 refractive index liquid. Particle is on a membrane filter.

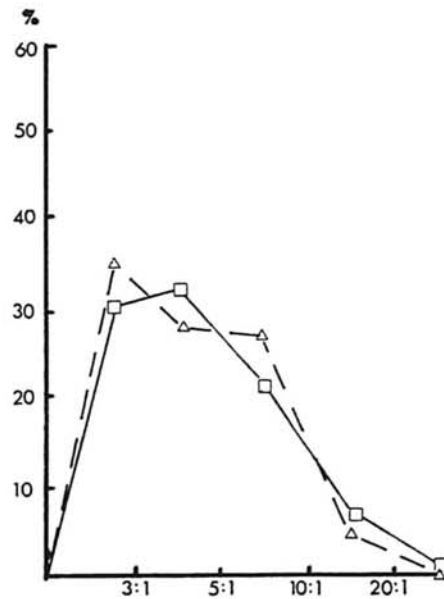


FIGURE 8. Percent amphiboles in each aspect group for a sample handled in two ways: solid line shows results using traditional method and dashed line shows results using centrifuge method. Dimensions of 100 particles measured for each curve.

Table 2. Summary of size and aspect ratio data used to construct Figure 8.

Method	Size, %		
	5-10 μm	10-15 μm	$\geq 15 \mu\text{m}$
Traditional	57	26	16
Centrifuge	33	27	38
	Mean length, μm	Mean width, μm	Mean aspect ratio, μm
Traditional	12.5	3.0	4.4
Centrifuge	17.5	4.7	4.6

Further, the results from this study demonstrate the utility of the centrifuge method not only for obtaining a count of particles, but also for obtaining information on the shape of particles in a population. It should be emphasized that the aspect ratio curves determined for samples *I* and *M* would have been virtually impossible to obtain using the FDA procedure. The determination would have required examining over 3000 FOV. As indicated previously, many talc flakes on edge appear to be fibers and must be examined during such a scan, making the whole job impossibly tedious.

Finally, even in those cases where one may wish to use the standard 100 FOV count, the centrifuge method offers a way to screen samples between those times when a more lengthy count is made, and it permits a double check of values so determined. In addition, the tendency to bring down a disproportional number of larger particles has the advantage that with true asbestiform amphiboles one

generally sees some particles showing bundles of fibrils which removes any doubt about the nature of the amphibole.

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